Evaluation of a pricing and communications intervention with food wholesalers and small stores to improve supply and demand of healthier foods in Baltimore City

by
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ABSTRACT

Despite acknowledgement of our country's current obesity epidemic and its far-reaching health consequences, public health experts have not been able to reduce its prevalence. Of particular concern are individuals living in economically-deprived areas, where access to healthy foods, physical activity outlets, and affordable and/or quality healthcare are low, and access to inexpensive and palatable junk foods is high. Small food stores are primary food sources in under-resourced areas, and as such, are viable targets for intervention. A decade of research has shown that small store intervention programs can effectively increase healthy food availability and shift individual food behaviors. However, none of these interventions have incorporated wholesalers or other food suppliers, which are influential components of the supply chain that typically provide product, marketing, promotional and stocking support. Additionally, no small food store studies have tested the impact of pricing discounts to increase healthy food supply and demand. Testing price reductions on consumer and retailer purchasing behaviors is important for two reasons: 1) food products at small independent stores generally cost more due to low economies of scale, and 2) the customers of these stores are generally low-income and thus, more price-sensitive. As a result, if healthier foods are available, they may not be affordable in small stores.

B'More Healthy Retail Rewards (BHRR) (PI: Joel Gittelsohn) was a multi-level intervention trial (2011-2014) that tested the effectiveness of store-directed pricing discounts and health communications, separately and combined, on healthy food

purchasing and consumption among low-income small store customers in Baltimore City. This thesis was a sub-study of the BHRR, and focused on the wholesaler and retailer (small food store) component, and assessed outcomes at these levels. Furthermore, it tested the effectiveness of supplier-to-retailer price incentives (as opposed to consumer-directed price promotions), which are utilized frequently in supermarkets to 'push' sales of specific items, but used rarely in small urban food stores.

Twenty-four trial small food stores ("corner stores") were randomized to pricing intervention, communications intervention, combined pricing and communications intervention, or control. Stores that received the pricing intervention were to receive a 10-30% price discount on selected healthier food items including drinks, staple foods, and snacks, at the point of purchase from two food wholesale stores during the 6-month trial. Communications stores received visual and interactive materials to promote healthy items, including signage, taste tests, and refrigerators. Pre- and post-intervention surveys were completed with the 24 storeowners and assessed changes over time in stocking, sales, and prices of promoted healthy foods, as well as associated storeowner psychosocial factors, compared to control. All intervention groups saw significant increases in total stocking of promoted foods compared to control, and the combined pricing and communications interventions found significant increases in the sales of healthier snacks (baked chips, low-fat granola bars, fruits). The increase in snack sales in the combined stores was seen despite evidence that discounts on these foods were not passed from the retailer to the consumer.

Wholesale-level intervention implementation was conducted to assess reach, dose delivered, dose received, and fidelity during the 6-month trial using wholesale sales records, 23 storeowner exposure surveys, and 22 wholesaler visit evaluations. Overall, the wholesale-level communications intervention was implemented well and overall stocking of promoted foods was high, while the wholesale-level pricing intervention implementation was moderate. The intervention was implemented with high reach with 77.8% of intervention storeowners purchasing promoted foods during a 90-day period. Dose delivered and stocking fidelity were high (>90%), while pricing fidelity was moderate (66%). Dose received of specific intervention components ranged from low (36%), in terms of storeowners reported noticing a price decrease on promoted items, to high (100%), in terms of storeowners noticing promoted foods during visits to the wholesaler.

Results suggest that store-directed pricing or communications interventions, separately or in combination, are successful in increasing healthy food availability (supply), but that combined approaches may be necessary to increase sales (demand) of healthier foods in small urban food stores. Future interventions should strive to collaborate with additional suppliers, such as delivery vendors and higher-level food distributors and manufacturers, in order to reduce bottlenecks to healthier food access. Researchers should further explore the mechanism by which store-directed price discounts on healthy foods can impact consumer food behaviors in small urban food stores. This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

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TABLE OF CONTENTS

TABLES

CHAPTER 2

CHAPTER 3

CHAPTER 4

CHAPTER 5

CHAPTER 6

CHAPTER 7

FIGURES

CHAPTER 3

CHAPTER 4

CHAPTER 5

CHAPTER 6

CHAPTER 1. INTRODUCTION

1.1. PROBLEM STATEMENT

Obesity has become one of the most serious and costly domestic public health challenges of the 21st century, and despite efforts, no country in the world has succeeded in reducing its prevalence (Brown, Sharma, Ardern, Mirdamadi, & Kuk, 2015); Roberto et al., 2015). Although obesity prevalence appears to have leveled off among some subgroups, it has stabilized at very high rates (35% for adults, 17% for children), and the burden of disease continues to fall disproportionately on minorities and the poor (Drewnowski, 2009; Drewnowski & Spector, 2004). Higher body weight increases morbidity for several chronic health conditions, including heart disease, stroke, Type 2 diabetes, hypertension, and some cancers (Hammond & Levine, 2010; Lim et al., 2012; Popkin, Kim, Rusev, Du & Zizza, 2006). Annual medical costs for those who are obese are $1,429 higher than those of normal weight (Finkelstein, Trogdon, Cohen, & Dietz, 2009), and the highest rates of obesity are found among non-Hispanic blacks (49.5%), followed by Hispanics (42.5%), and middle age adults (40-59 yrs, 39.5%) (Ogden, Carroll, Kit, & Flegal, 2014).

At its most rudimentary level, obesity results when energy intake exceeds expenditure. However, the energy balance equation is deceptively simple because it does not account for the multiple and complex factors that affect weight status. For example, undernutrition during fetal development may lead to an infant's higher risk for insulin resistance, obesity, diabetes type 2, hypertension, and cardiovascular disease in

adulthood due to survival adaptations (i.e., 'thrifty phenotype')(Hales & Barker, 2013; Prentice & Moore, 2005). Globalization and accompanying changes in global food systems are thought to be the major drivers of the epidemic (Swinburn et al., 2011). An inexhaustible supply of heavily marketed, cheap, and palatable foods, coupled with society-wide declines in energy expenditure due to labor-saving devices and advancing technology, has perpetuated excess weight status among Americans (Swinburn et al., 2011). As such, obesity can be viewed as a normal reaction to an obesogenic environment (Swinburn et al., 2011). Multi-level interventions that seek to change both the food environment and individual behavior are needed, as prior individual-level strategies have failed to reverse the obesity epidemic (Roberto et al., 2015).

The food environment has a major influence on the development of obesity and associated chronic diseases (Hill & Peters, 1998; Morland, Wing, Diez Roux, & Poole, 2002; Wang & Beydoun, 2007), as individual eating habits are largely determined by the food choices that are available (Drewnowski & Specter; 2004; Sallis & Glanz, 2009). In low-income urban neighborhoods, small food stores are a primary food source among residents (Bodor, Ulmer, Dunaway, Farley, & Rose, 2010; Gittelsohn et al., 2007). These stores are often void of nutrient-dense foods like fruits and vegetables, and replete with high-calorie and high-fat snack foods (Bodor, Rose, Farley, Swalm, & Scott, 2008; Franco, Diez Roux, Glass, Caballero, & Brancati, 2008). In the case of Baltimore City, black residents (65% of the city's population) have disproportionately low access to healthy foods and are the most likely of any racial group to live in food desert areas, where access to healthy food is limited (MFSMP, 2015). A community food assessment found

that 46% of monthly shopping trips among black residents were in these small stores, with average expenditures of $114 per month (Palmer, Smith, Haering, & McKenzie, 2009).

In the last decade, an increasing number of public health programs have sought to increase the availability and sales of healthier foods in corner stores (Escaron, Meinen, Nitzke, & Martinez-Donate, 2013; Gittelsohn, Rowan, & Gadhoke, 2012). One of the hurdles encountered in program implementation is the lack of motivation from food retailers to stock healthy items (Bodor et al., 2008; Gittelsohn et al., 2007). Small retailers often view healthier foods as unprofitable; either because of perishability (i.e., fruits and vegetables), high wholesale costs, or perceived low consumer demand (Bodor et al., 2008; Gittelsohn et al., 2007; Song, et al., 2009). Store suppliers (i.e., wholesalers, vendors) may, in turn, perceive low retail demand for the healthy items, and limit their offerings and marketing efforts. However, research shows that heathier food can be extremely lucrative if made available and properly marketed (Cardello, Wolfson & Foundation, 2014). Lower-calorie products drove virtually all of the growth at Healthy Weight Commitment Foundation companies[1] from 2006 to 2011, accounting for 52.5% of sales and 99% of the sales growth (Cardello et al., 2014). Store-based trials that seek to increase consumer demand and retail supply of healthy foods must also engage

[1] The HWCF is a CEO-led organization that aims to reduce obesity via a commitment to eliminate 1.5 trillion calories from the market by 2015. Companies include Bumble Bee Foods, LLC, Campbell Soup Company, The Coca-Cola Company, ConAgra Foods, General Mills, Inc., The Hershey Company, Kellogg Company, Kraft Foods, Inc. (now Kraft Foods Group, Inc. and Mondelez International), Mars, Inc., McCormick & Company, Inc., Nestlé USA, PepsiCo, Inc., Post Foods, LLC, Sara Lee Corp. (now Hillshire Brands), The J.M. Smucker Company and Unilever.

higher-level food suppliers (i.e., wholesalers, vendors, distributors, and manufacturers) to ensure adequate stock, high quality, and fair prices of healthy foods.

A novel way to motivate store owners and food wholesalers to stock healthier foods is through performance allowances (also known as trade promotions or promotion allowances), a standard food industry marketing practice. With performance allowances, manufacturers pay downstream suppliers or retailers for a certain performance, such as a slotting allowance to acquire shelf space to place a product or an advertising allowance to display marketing materials for a certain food or beverage. Trade promotions have been historically used in large food stores to increase sales and stocking of certain foods (Poddar & Donthu, 2011). However, performance allowances could be utilized to increase sales and consumption of healthier and lower-calorie foods in smaller stores, especially in low-income areas where consumers are the most price-sensitive. For example, snack manufacturers could provide slotting allowances to display their baked chip lines on front-of-store shelves, which may increase both supply and demand of these lower-calorie snacks. To my knowledge, no public health intervention trial has employed performance allowances as a pricing strategy to increase healthy food availability, purchases and consumption.

B'More Healthy Retail Rewards (BHRR) was a NIH-funded trial (2011-2014) that sought to develop, implement, and evaluate a multi-level communications and pricing intervention to improve access to and consumption of healthier foods for low-income residents of Baltimore City (Budd et al., 2015). The BHRR program targeted three interconnected levels of the local food environment (consumers, small stores, and local

wholesalers), and sought to evaluate the impact of the program at the consumer- and store-levels. Twenty-four corner stores were randomized to one of four treatment groups: communications only (n=6), pricing only (n=6), combined communications & pricing (n=6), or control (n=6).

My thesis study focuses specifically on the wholesaler and store component, and assesses outcomes at these levels. My overall dissertation goal is to examine the effectiveness of such pricing incentives, with and without communications, on wholesale-level stock, and store-level stock and sales of promoted foods. The study has three aims:

Research Aim 1: *To describe the study design of B'More Healthy Retail Rewards and to introduce an industry-driven pricing approach in a public health setting.*

Research Aim 2: *To evaluate the implementation of the wholesale-level pricing and communications intervention through process evaluation.*

Research Aim 3: *To examine the effects of performance-based monetary incentives (10-30% discount) and communications strategies, separately and combined, on store stock sales, and prices of promoted healthful foods, and on related storeowner psychosocial variables.*

1.2. SUMMARY OF DISSERTATION CHAPTERS

This is the first of eight chapters. Chapter 2 is an extensive literature review of obesity, the role of the food environment, store- and pricing-based intervention trials, and industry-led, self-regulatory approaches to improving individual food behaviors.

Chapter 3 describes the methods used for this dissertation study, including store- and wholesaler-level: recruitment procedures, setting descriptions; intervention development and implementation; data collection and analyses; and data collector training and ethical considerations. Chapter 4 is a short chapter dedicated the store- and wholesale-level formative research findings, which informed the pricing and communications interventions at these levels.

Chapter 5 is the first of three journal papers, and presents a review of the BHRR study design, development, and implementation, as well as the rationale for an innovative pricing strategy. This study protocol paper was published in *BMC Public Health (2015)*.

Chapter 6 is the second paper, and evaluates the implementation and feasibility of the wholesale-level pricing and communications intervention. A process evaluation was conducted to assess reach, fidelity, and dose delivered and received using wholesale sales records, observations, and storeowner exposure questionnaires. This is the first study to evaluate the implementation of a wholesale-level intervention to increase healthy food supply and demand in urban settings. The target journal for this paper is *BMC Public Health*.

Chapter 7, the third paper, presents findings on the impact of pricing and communications interventions, separately and combined, on small store sales, stocking, pricing, and related psychosocial variables. Stores that received the pricing intervention were given a 10-30% price discount by wholesalers on selected healthier food items, such as fresh fruits, frozen vegetables, and baked chips, at the point of purchase from

two food wholesale stores during the 6-month trial. Communications stores received visual and interactive materials to promote healthy items, including signage, taste tests, and refrigerators. This was the first study to evaluate the effect price discounts on small store supply and demand of healthier foods, and the first to do so through performance allowances. The target journal for this paper is *Public Health Nutrition*.

The last chapter, Chapter 8, discusses the thesis study's strength and limitations, and provides a summary of the main findings in relation to study aims. Most importantly, it provides recommendations for future research and practice to increase healthier food supply and demand in low-income urban neighborhoods.

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CHAPTER 2. LITERATURE REVIEW

This chapter reviews the literature related to my thesis study. It begins with a summary of the public health burden that obesity poses on adults both domestically and worldwide. Second, I review the known causes of obesity, and the impact of the food environment and food access on obesity in the U.S, and the need for multilevel interventions. Third, I discuss the health and food equity challenges faced by Baltimore City, and current strategies to mitigate racial health disparities. This is followed by a discussion on the role of the local food supply, and specifically the role of wholesalers and small food stores. Finally, there is a comprehensive review of current and past small store programs and pricing interventions, self-regulatory pricing strategies to improve healthy food behaviors, and strategies that the food industry could utilize to shift consumer preferences. Key gaps in the literature are also identified throughout this review.

2.1 BURDEN OF OBESITY

One-third of the world population, or 2.1 billion people, are overweight or obese (BMI ≥25 kg/m^2) (Ng et al., 2014). To add perspective, the number of individuals that suffer from malnutrition is an estimated 840 million people worldwide (Dobbs, Manyika, Chui & Lund, 2014). The relationship between obesity and non-communicable disease accounts for an estimated 3.4 million annual deaths globally, and includes heart disease, stroke, hypertension, hyperlipidemia, type 2 diabetes, gallbladder disease, and several types of cancer (Hammond & Levine, 2010; Lim et al., 2012; Popkin et al., 2006). Recent

data suggests that obesity prevalence may be plateauing in some developed countries, including the United States, but it has stabilized at extremely high rates (Flegal, Carroll, Kit & Ogden, 2012). For other developed countries (e.g., France, Switzerland, Kuwait) and developing countries (e.g., Honduras, Micronesia), obesity prevalence continues to increase (Dobbs et al., 2014). In the last three decades, no country has reversed the epidemic, and there is little evidence to suggest that public health efforts to reduce obesity have succeeded (Ng et al., 2014; Roberto et al., 2015).

In the United States, approximately two-thirds of adults are overweight or obese, half of those are obese, and 5% are morbidly obese (BMI ≥ 40 kg/m^2) (Wang & Beydoun, 2007). The financial burden attributed to overweight status is equally staggering, with direct medical costs estimated to be as high as $147 billion per year, or 10% of all healthcare spending (Finkelstein et al., 2012; Hammond & Levine, 2010). The financial burden of obesity in the U.S. is 2-3 times greater than in other developed countries (Tsai, Williamson, & Glick, 2011).

The health disparities between African Americans and Caucasians are well-documented, and by almost every measure, African Americans have worse health outcomes than do white Americans (CDC, 2013). African American adults have the highest overall prevalence of obesity (males-33%, females-51%), diabetes (11.3 %), hypertension (41.3%), HIV infection, and highest death rates from colorectal cancer, heart disease, and stroke compared with other racial and ethnic populations (CDC, 2013). Although the gap has narrowed, the average black American's life expectancy

(75.3 years) is 3.5 years shorter than the life expectancy for the average white American (78.8 years) (CDC, 2013).

Very small changes in weight can have substantial effects on reducing health burdens (Wang, McPherson, Marsh, Gortmaker & Brown, 2011). A 1 kg (2.2 lb) reduction (or a net calorie reduction of 20 kcals/day for 3 years) across the U.S. population would prevent 2.1-2.4 million cases of diabetes, 1.4-1.7 million cardiovascular diseases, 73,000-127,000 cases of cancer, and gain 16 million quality-adjusted life years (Wang et al., 2011). *Targeted obesity prevention and reduction strategies are needed to reduce modifiable health disparities among ethnic minorities.*

2.2 CAUSES OF OBESITY

The complexity of obesity and the inability to reverse trends have led obesity researchers to adopt more multi-level approaches, which consider interactions between multiple factors, and do not limit interventions to individual behavior change strategies. Throughout time, humans evolved with the ability to cope with food scarcity rather than abundance, and are genetically predisposed to seek out energy-dense foods and to conserve energy as fat (Dobbs et al., 2014). In the past 40 years, rises in obesity prevalence have coincided with major changes in the global food supply, including increases in cheap, palatable, non-perishable, and energy-dense foods (Swinburn et al., 2011). Public health experts look to food supply changes as a major driver of the epidemic, as obesity rates have increased too rapidly for genetics to be an underlying factor (Anderson-Steeves, Martins & Gittelsohn, 2014; Swinburn et al., 2011).

While individuals must ultimately make the choice to consume certain foods and beverages, the current environment exploits biological, psychological, and socio-economic vulnerabilities that encourage overconsumption of unhealthier options (Roberto et al., 2015). Food industry lobbying prevents governments from implementing food policies to improve public health. The default side orders in restaurants are often fried and highly caloric. Non-perishable, ultra-processed foods are not only less satiating because of the lack of fiber or protein, but are also less expensive than healthier options. As Roberto and colleagues (2015) state in the second Lancet series on obesity, "a vicious cycle is created in which the preference and demand for unhealthy products are not only shaped by the environment, but lead to environmental changes that further encourage consumption of unhealthy foods." Acculturation studies provide a powerful lens in which to examine the role that the environment plays on weight outcomes. A 2013 systematic review found that seven out of nine U.S. immigrant obesity studies reported overall positive associations between the degree of acculturation and body weight among immigrants from six countries (Delvari, Sonderlund, Swinburn, Mellor, & Renzaho, 2013).

The interplay between factors, such as biology, innate food preferences, and cultural influences, within an evolving obesogenic environmental landscape has caused researchers to conceptualize the causes of obesity as a 'system', in order to examine interrelationships and target areas for intervention. The UK Foresight Obesity Project has identified more than 100 known variables that influence energy balance over seven underlying themes, including physical activity (individual and built environments),

individual and social psychology, physiology, food production, and food consumption (Vandenbroeck, Goossens, & Clemens, 2007). In short, systems-level models try to consider the 'big picture', like ecological models, but also seek to press multiple levers and examine their interactions, so that effective and sustainable programs can be implemented (Kumanyika, Parker & Sim, 2010).

2.2.1. THE FOOD ENVIRONMENT

The food environment has been identified as a major factor in the development of obesity and associated chronic diseases, as individual eating habits are largely determined by the food choices that are available (Giskes, Van Lenthe, Avendano-Pabon, & Brug, 2011; Gustafson, Hankins, & Jilcott, 2012). However, the precise role of specific features of the food environment on weight outcomes and food-related behaviors is unclear (Feng, Glass, Curriero, Stewart, & Schwartz, 2009; Giskes et al., 2011; Gustafson et al., 2012; Mattes & Foster, 2014). The phrase 'food environment' includes the food sources to which an individual has access and what is available within those environments (i.e., types of foods, food prices, food marketing).

Gustafson and colleagues, in a 2012 systematic review, found no consistent associations between features of the food environment and dietary outcomes or BMI (Gustafson et al., 2012). A systematic review by Giskes et al (2011) found that individuals with greater access to supermarkets and limited access to takeaway outlets had lower prevalence of overweight/obesity than those with limited supermarket access or greater access to takeaway outlets. A review by Lovasi, Hutson, Guerra and Neckerman (2009) showed that among low-income minority groups, specific

characteristics of the built environment, such as supermarket access, exercise facilities, and safety, were correlated with BMI and food behaviors. Finally, a longitudinal study by Gibson (2011) revealed that neighborhood density of small food stores was positively and significantly associated to obesity and BMI of urban residents (Gibson, 2011).

The variability of results suggests a nuanced and complex association between the food environment and weight outcomes or food behaviors (Gordon-Larsen, 2014). Inconsistencies in the evidence base call for more systematic measurement of the food environment and related outcomes, longitudinal data collection that characterize changes in the food environment (as opposed to cross-sectional surveys), and more sophisticated statistical modeling of associations (Feng et al., 2010; Gordon-Larsen, 2014; Gustafson et al., 2011). In addition, the heterogeneity of associations between the environment and weight outcomes across ethnicity, income, gender, and region (urban vs. rural), make interpretation more complex (Gordon-Larsen, 2014). Nevertheless, increasing access to healthy foods is both intuitive and logical as an obesity prevention strategy (O'Malley, Gustat, Rice, & Johnson, 2013). Because individual-level behavioral interventions have been unsuccessful in creating long-term effects on weight status, environmental modifications are believed to be important facilitators in creating health changes (Casagrande, Whitt-Glover, Lancaster, Odoms-Young, & Gary, 2009).

Low-income, urban, and minority neighborhoods have fewer chain supermarkets, more small food stores, higher crime rates, and less opportunity for physical activity (Bodor, Rice, Farley, Swalm, & Rose, 2010; Lovasi et al., 2009; Story,

Kaphingst, Robinson-O'Brien, & Glanz, 2008; Treuhaft & Karpyn, 2010). Residents of low-income areas have a greater likelihood of obesogenic dietary intakes than higher-income counterparts (Giskes et al., 2010). The relative excess of unhealthy food compared with healthy food in urban minority neighborhoods may lead to less healthy and higher-calorie diets (Farley et al., 2009). However, simply increasing the supply of healthier foods may not be sufficient to increase their purchase and consumption if they are not affordable within those environments (Lovasi et al., 2009). In addition, environmental changes that improve conditions for all may actually increase health disparities, as research shows that advantaged subgroups benefit the most from new resources when provided at the same level (Lovasi et al., 2009; Neff, Palmer, McKenzie, & Lawrence, 2009). *Interventions that seek to reduce ethnic health disparities should focus on increasing healthy food affordability, as well as availability, within existing food sources (i.e., small stores).*

2.2.1.1. THE BALTIMORE CITY FOOD ENVIRONMENT

Patterns of obesity prevalence among subpopulations are largely predictable. In low-income countries, obesity affects adults of high socioeconomic status in urban areas (Swinburn et al., 2011). In high-income countries, obesity affects all individuals, but is disproportionately higher among low-income and disadvantaged groups (Swinburn et al., 2011). In the U.S., minority groups have a higher combined prevalence of obesity than whites, and non-Hispanic blacks have the highest prevalence among all ethnic groups (Lovasi, et al., 2009; Wang & Beydoun, 2007).

Adult obesity prevalence worsened in all 24 Maryland jurisdictions in the past decade, and significant weight disparities exist between regions ("Burden of Overweight", 2008). Baltimore City has one of the highest rates of obesity (35%) in the state, while neighboring counties, including Howard (18%), and Montgomery (17%), have the lowest ("Burden of Overweight", 2008). The city's median household income is almost half that of the state of Maryland ($39,386 vs. $70,647), and over one-fifth of resident individuals live below poverty level, compared to 9% in the state (U.S. Census Bureau, 2013). Sixty-four percent of Baltimore's residents are black, 30% are white, and 4% are Hispanic. Racial and ethnic groups are concentrated differently in specific areas, largely fueled by residential segregation over 50 years ago, contributing to social and health inequities today ("Place Matters", 2012). Differential access to healthy foods further exacerbates these disparities (Haering & Franco, 2010). Franco, Diez-Roux, Glass, Cabellero, & Brancati (2008), in a cross-sectional study across 159 Baltimore City neighborhoods, found that black and low-income neighborhoods had considerably less availability of healthy foods compared to white and high-income neighborhoods. Small food stores, including behind-the-glass stores, are heavily concentrated in predominantly black neighborhoods and these stores are often lacking healthier foods such as fresh produce, low-fat milk, and whole wheat bread (Haering & Franco, 2010). Furthermore, the healthy food availability index score (HFAI) for local supermarkets in black and lower income neighborhoods, where a higher score indicates greater healthy food availability, was half that of scores in white and higher income neighborhoods (Haering & Franco, 2010). *Creating equitable food environments, including access to*

healthy foods for all residents, is a necessary step to reducing social health disparities in Baltimore.

2.2.1.2. THE ROLE OF CORNER STORES AND LOCAL FOOD WHOLESALERS

Within city limits, there are approximately 659 small food stores (corner stores or behind-the-glass stores), many of which are located in Baltimore's food deserts, low-income areas of the city with limited access to supermarkets or grocery stores (MFSMP, 2015). As a predominant food source in Baltimore City, small food stores are important locales for intervention since improvements to existing stores are more cost-effective than supporting a new supermarket in resource-scarce areas. Furthermore, a 2007 community food assessment found that 46% of monthly shopping trips among residents are in corner or behind-the-glass stores and average expenditures are $114 per month (Palmer, et al., 2009). Small food stores have filled the gap left behind as larger grocery stores have relocated out of the city or have closed down (Gittelsohn et al., 2007).

Local food wholesalers and chain supermarkets are the main sources of food procurement for owners of Baltimore City corner stores (BHRR, unpublished data). Food wholesalers sell larger quantity goods (i.e., cases versus individual units) to other retailers and other industrial, institutional, and commercial users, but generally do not sell in large amounts to the end consumer. An earlier store-based feasibility trial with Baltimore City corner storeowners found that lack of healthy food availability at the wholesale-level and higher wholesale costs of healthy foods were a major barrier to purchasing and stocking these items in their corner stores (Song et al., 2011). Food wholesalers have the potential to improve access, point of purchase decision-making,

and intervention sustainability by stocking and providing temporary price reductions on healthy foods to small stores. Reduced prices by the wholesaler may increase storeowners' behavioral capacity to stock healthier foods by reducing cost barriers. Missing from the literature are wholesaler interventions aimed at improving consumption behaviors in low-income minority populations. Prior store-based studies seeking to expand healthy food access have not targeted higher levels of the food distribution chain, including wholesalers (Anderson, et al., 2014). *To address this gap, we worked with both small food stores and local food wholesalers to increase the supply and reduce the cost of healthier foods.*

2.3. SMALL FOOD STORE PROGRAMS

In recent years, obesity research has included interventions to improve healthy food availability and access in small food stores, which tend to carry calorie-dense beverages and high-fat snacks, and few fruits and vegetables. Small stores in Baltimore city are a good venue to work in due to their ability to reach the surrounding community and because many consumer food choices are made within the store at the point of purchase. Until a decade ago, store studies were few, and evaluation and sustainability were poorly addressed (Seymour, Yaroch, Sedula, Blanck, & Khan, 2004). Seymour et al. (2004) found that out of 10 store studies reviewed, six saw an increase in healthy food sales, but none took place in small food stores.

A 2012 review of 16 small store interventions, found consistent improvements in stocking and sales of promoted foods, and consumer purchasing and consumption of those foods (Gittelsohn, Rowan, & Gadhoke, 2012). Trials that measured fruit and

vegetable sales observed an average increase of 25-50%. Most of the trials promoted healthier foods with some sort of communications strategy such as signage, shelf labels, handouts, and/or structural change such shelving or refrigeration. Only six trials reduced prices to increase healthy food access within small stores. Reviews by Gittelsohn et al (2012) and Liberato, Bailie and Brimblecombe (2014) highlighted the need for combined environmental (e.g., pricing) and behavioral (e.g., nutrition education) approaches in small store studies. Temporary price discounts are frequently utilized in the food industry to increase sales but little is known about what portion of the increase is attributable to price versus the promotional activities that accompany it and few randomized control trials have teased apart the effects (Wall, Mhurchu, Blakely, Rodgers, & Wilton, 2006*). More rigorous evaluation designs are needed to determine which combinations of these strategies is most effective* (Escaron et al., 2013).

2.4. PRICING AND COMBINED STUDIES

The price of food is one of the most important determinants of consumer purchasing decisions (Glanz, Basil, Maiback, Goldberg & Snyder, 1998). Intervention studies have demonstrated that price reductions can positively affect consumer demand and consumption of healthful foods (Andreyeva, Long, & Brownell, 2010; Blakely et al., 2011; Epstein et al., 2012; French et al., 2001; Gittelsohn et al., 2012; Song et al., 2009). A systematic review of field experiments by An (2013) demonstrated that consumer-directed price discounts were consistently effective in increasing the purchase and consumption of healthier promoted foods. However, most of the studies occurred in larger food venues, such as supermarkets, restaurants, and cafeterias, and only 4 out of

20 studies targeted low-income populations (An, 2013). A 2008 price and health education intervention in the Harvard School of Public Health cafeteria observed a 6% increase in the consumption of healthy foods when prices were reduced by 20%, and a total increase of 17% after prices returned to original levels, providing evidence that temporary price reductions may sustain an increase in demand (Michels, Bloom, Riccardi, Rosner, & Willett, 2008). However, closed venues, such as cafeterias, vending machines, and schools or churches, offer limited options and more control over the population because the environment stays relatively constant. The success of interventions in open-community settings, such as supermarkets, restaurants, and small stores, may be more difficult due to the availability of substitutes.

Combined pricing and health communications or education studies show varied results (Epstein et al., 2012; French et al., 2001; Horgen & Brownell, 2002; Michels et al., 2008; Ni Mhurchu, Blakely, Jiang, Eyeles, & Rodgers, 2010). Horgen & Brownell (2002) found the price decreases alone were more effective than combined or health communications alone to increase healthier restaurant purchases. The CHIPS vending machine study found that both pricing alone and communications alone positively affected healthy snack sales (French et al. 2001). Anderson et al. (2001) found that Farmer's market coupons alone and education alone had positive effects, with the maximum effects achieved through a combination of coupons and education (Anderson et al., 2001). *Store-based trials that test the effects of price reductions and communications strategies on food behaviors are needed, specifically in low-income U.S. settings where communities may be more sensitive to small price changes* (Powell &

Chaloupka, 2009). A comprehensive review of store-based pricing studies is included in the next section.

2.4.1. STORE-BASED PRICING STUDIES

Experimental research on the effects of price manipulations on store food purchasing behaviors is still in its infancy. All but two of the store-based pricing studies have occurred in the last five years and only six store-based trials are currently published that are designed to evaluate the effects of price reductions separately from other intervention components (Ball et al., 2015; Bamberg, 2002; Bihan et al., 2012; Brimblecombe et al., 2013; Ni Mhurchu et al., 2010; Waterlander, de Boer, Schuit, Seidell, & Steenhuis, 2013). These trials are summarized in **Table 2.1** and also include five other store-based trials that test the singular effects of price-reductions on healthy options (An, 2013; Geliebter et al., 2013; Herman, Harrison, Afifi, & Jenks, 2008; Klerman, Bartlett, Wilde, & Olsho, 2014; Phipps et al., 2015; Sturm, An, Segal, & Patel, 2013). Excluded from the table are store-based trials that may have included a pricing strategy (combined with a behavioral strategy) but did not test the independent effects of price reductions. Systematic reviews of food store trials have been conducted previously by Gittelsohn et al. (2012) and Escaron et al. (2013).

Table 2.1. Summary of store-based pricing studies*

Authors, Year(Study Name)	Target Population/Sample	Setting	Study Design & Duration	Intervention Strategy	Foods Promoted	Outcome Measures	Study Results	Intervention Effectiveness
Combined Studies								
Ball et al, 2015 (SHELf)	Female primary household shoppers (low and high SES) n=642	Any Coles' supermarket Melbourne, Australia	2x2 factorial RCT 3-month intervention period	Participants randomly assigned to 1) 20% price-reduction, 2) skill-building, 3) combined intervention, or 4) control.	All fruits and vegetables (F&V), water, and diet soft drinks	Supermarket scanner data to measure participants' purchase of F&V, and promoted beverages at 3 time-points (baseline, 3-mo, 9-mo.) Self-reported consumption of promoted foods at 3 time-points (baseline, 3-mo, 9-mo.)	↑ purchases total V and frozen V in pricing only group vs. control, but ↑ not maintained at follow-up. ↑ purchases total F and fresh F in both price intervention groups vs. controls, but ↑ not maintained at follow-up. ↑ consumption of F and SSBs in pricing only and skill-building groups vs. control	(+) 20% price reduction effective in ↑ F&V purchasing (+) Price reduction and skill-building effective in ↑ V consumption (-) Price reduction and skill-building created an ↑SSB consumption (-) Combined intervention approach did not have greater effects than pricing alone. (-) Intervention effects were not sustained at follow-up
Waterlander et al., 2013	Low SES supermarket shoppers n=199	4 Supermarkets Rural provinces The Netherlands	2x2 factorial RCT 6-month intervention period	Participants randomly assigned to 1) 50% price-reduction, 2) nutrition education, 3) combined intervention, or 4) control.	F&V	Supermarket register receipts measured F&V purchases at 5 time-points (baseline, 1 mo, 3 mo, 6 mo, and 9 mo.) Consumption of F&V using brief	↑ F&V purchases in pricing only and combined group vs. control at 6-mo. ↑ consumption of F&V in pricing only and combined groups vs. control	(+) 50% price reduction groups (w/wo education) effective in ↑ F&V purchasing (+) 50% price reduction groups (w/wo education) effective in ↑ F&V consumption

Table 2.1. Summary of store-based pricing studies*

Authors, Year(Study Name)	Target Population/Sample	Setting	Study Design & Duration	Intervention Strategy	Foods Promoted	Outcome Measures	Study Results	Intervention Effectiveness
						FFQ at 2 time-points (baseline, 6-mo.)		(-) Education had no effect on F&V purchases or consumption (+) Combined intervention approach saw greater effects on F&V purchasing than pricing alone. (-) Intervention effects were not sustained at follow-up.
Bihan et al., 2012	Low SES adults n=302	22 Supermarkets France	Randomized Trial 12-month intervention period	Participants randomly assigned to 1) dietary advice group, or 2) dietary advice group + F&V vouchers (€10-40/month)	F&V	Self-reported F&V consumption using dietary questionnaire at 2 time-points (baseline, 3-mo.) Anthropometrics, blood lipids, blood pressure, blood glucose, and vitamin biomarkers assessed through clinical exam/blood samples at 2 time-points (baseline, 3-mo.)	↑ consumption of F&V in both groups Voucher group had a signif. ↓ risk of low F&V consumption compared to advice group No difference in biomarkers or weight status between groups.	(+)Both interventions were effective to increase F&V consumption.

Table 2.1. Summary of store-based pricing studies*

Authors, Year(Study Name)	Target Population/Sample	Setting	Study Design & Duration	Intervention Strategy	Foods Promoted	Outcome Measures	Study Results	Intervention Effectiveness
Ni Mhurchu et al., 2010 (SHOP)	Maori, Pacific, and non-Maori/Pacific adult food shoppers n=1104	8 Supermarkets New Zealand	2x2 factorial RCT 6-month intervention period	Participants randomly assigned to 1) 12.5% price-reduction on healthier foods, 2) nutrition education, 3) combined intervention, or 4) control.	1035 foods and beverages that met the Heart Foundation's Tick program nutrient profiling criteria (e.g., F&V, meats cereals, milk products)	Purchases of healthier food, fats, energy, and other nutrients using supermarket scanner data at 3 time-points (baseline, 6 mo., 12 mo.)	↑purchase of healthier foods in pricing only and combined groups vs. education only and control.	(+) 12.5% price reduction groups (w/wo education) effective in ↑ healthier food purchasing (+) Effect of price discounts were sustained at 12 months (-) Education had no effect on food purchases (-)No effects of any intervention on saturated fat or other nutrient purchases
Brimblecombe et al., 2013 (SHOP@RIC)	20 indigenous Australian communities n=150 individuals	Community grocery stores Remote areas of Indigenous Australia	Randomized cluster stepped wedge design 6-month intervention period	Communities randomly assigned to 1) 20% price-reduction only, or 2) price reduction & in-store nutrition education	F&V, water, diet soft-drinks	Gram weight purchases of F&V using electronic weekly sales reports at 3 time-points (baseline, 6 mo., 12 mo.) Self-reported dietary measures using surveys at 3 time-points (baseline, 6 mo., 12 mo.)	Not available	Not available
Bamberg, 2002	University students n=320	Organic food store (1) Germany	Quasi-experimental factorial design	Students assigned to 1) a stimulation message, 2)Coupon	Organic F&V	F&V purchases through coupon redemption by shop staff at	All 3 interventions were associated with a higher probability if	(+) Both coupons and stimulation messages were effective to

Table 2.1. Summary of store-based pricing studies*

Authors, Year(Study Name)	Target Population/Sample	Setting	Study Design & Duration	Intervention Strategy	Foods Promoted	Outcome Measures	Study Results	Intervention Effectiveness
			7-day intervention period	($7.5US), 3)Coupon & stimulation message, and 4) Control		continuous time-points.	organic F&V purchases versus control. There was no statistical difference between the 3 interventions.	increase F&V purchase
Pricing Only Studies								
Phipps et al., 2015	Low-income primary grocery shoppers n=58	Supermarket (1) Philadelphia, PA	4-phase prospective cohort with randomized intervention 12-week intervention period	Participants randomized to 1) 50% discount (8 wks), then 25% discount (4 wks) on F&V, and 2) wait-listed control (delayed intervention)	Fresh & frozen F&V	Fresh & frozen F&V purchases at multiple time-points (weekly) using scanner data	During the 50% phase, intervention group purchases of V were 3x higher, and F were 2x higher, than control group purchases. The 25% discount had no effect on F&V purchases	(+) The large discount was effective to increase F&V purchase. (-) The smaller discount was not effective to increase F&V purchase. (-) Intervention effects were not sustained at follow-up.
An, 2013; Sturm et al., 2013	Health Insurance Plan Members n=351,319	800 Supermarkets (Pick n Pay), 260,000 households South Africa	Cohort	Nationwide 'Healthy Food program' – participants receive 10 or 25% price discounts for healthier food purchases in supermarkets; non-members receive no discount	Six categories of foods, including F&V, carbohydrate-rich foods, protein-rich foods, dairy/dairy-alternatives, legumes, and oils/nuts/seeds.	Self-reported height and weight at 2 time-points (baseline, 12 months) Daily consumption of F&V, wholegrains, high sugar-foods, salted foods, processed foods, fried foods, and	Both the 10% and 25% discounts were associated with ↑ purchase & consumption of F&V and whole grains. Both the 10% and 25% discounts were associated with ↓ purchase & consumption of	(+) Both pricing interventions are effective in increases healthy food purchase & consumption and decreasing unhealthy food purchase & consumption.

Table 2.1. Summary of store-based pricing studies*

Authors, Year(Study Name)	Target Population/Sample	Setting	Study Design & Duration	Intervention Strategy	Foods Promoted	Outcome Measures	Study Results	Intervention Effectiveness
						fast foods using a standardized Health Risk Assessment questionnaire at 2 time-points Healthy food purchases via scanner data at 2 time-points	all unhealthier food groups. No intervention effect on BMI.	(-) No intervention effects on weight status.
Geliebter et al., 2013	Overweight (BMI≥25) and obese (BMI≥30) adult food shoppers n=47	2 Manhattan supermarkets (D'Agostino) New York City	RCT 8-week intervention period	Participants randomized to 1) 50% discount, or 2) control	F&V, bottled water, diet sodas	Promoted food purchases at multiple time-points (weekly) using scanner data BMI, fat composition, and promoted food consumption via survey collections (i.e., 24-hour recall) at 5 time-points (every 4 wks)	F&V purchases were 3x greater in intervention group versus control. F&V consumption ↑ in the intervention groups relative to control. No intervention effect on purchases or consumption of beverages. No intervention effect on weight status	(+) Price intervention was effective in increasing purchase and consumption of F&V. (+) Intervention effects on F&V consumption were sustained. (-) Price intervention was ineffective in increasing purchase and consumption of non-caloric beverages. (-)Price intervention was ineffective in decreasing weight status.

Table 2.1. Summary of store-based pricing studies*

Authors, Year(Study Name)	Target Population/Sample	Setting	Study Design & Duration	Intervention Strategy	Foods Promoted	Outcome Measures	Study Results	Intervention Effectiveness
Herman, Harrison, & Jenks, 2006; Herman et al., 2008	WIC participants (women) who enrolled for postpartum services n=602	3 WIC centers 3 supermarkets & 3 farmer's markets Los Angeles	6-month intervention period	Precursor to WIC package changes Participants group-randomized to 1) $10 weekly vouchers for farmer's market, 2) $10 weekly voucher for supermarket, and 3) control	F&V	F&V consumption via survey collections (i.e., 24-hour recall) at 4-6 time-points	Farmer's market and supermarket participants ↑ consumption of F&V compared to control and sustained the ↑ at 6-month follow-up.	(+) Price intervention was effective in increasing consumption of F&V. (+) Intervention effects were sustained.
Klerman et al., 2014 **(Healthy Incentives Pilot Study)**	SNAP participants n=2081	Food retailers that accept SNAP (60%) Hampden County, MA	Interim results RCT 8-week intervention period	Participants randomized to 1) 50% discount, or 2) control	WIC-approved F&V (e.g., excludes potato, fruit juice, etc)	F&V consumption via survey collections (i.e., 24-hour recall) at 2 time-points (baseline, 4-6-months)	HIP participants consumed 24% more F&V compared to control	(+) Price intervention was effective in increasing consumption of F&V.

***Included studies were those whose primary intervention strategy was a price-incentive, or those that tested effects of price reduction separately from other interventions. Simulation pricing studies (i.e., virtual supermarkets) or intervention studies that used a combined intervention strategy (POP, media, and small discounts) were not included.**

Healthy food purchase

Eight (of 11) trials measured intervention exposure on healthier food purchases. Of the seven trials with published results, all pricing arms were effective in increasing purchases of fruits and vegetables, among other promoted items. Of the five trials that measured the effects of some type of behavioral strategy separately (e.g., education, communications), two were effective in increasing healthier food purchase and three saw no effect. Of the four trials that measured the interactive effects of pricing and behavioral strategies, only one found that effects in the combined group were greater than pricing alone.

Healthy food consumption

Eight trials measured intervention exposure on healthier food consumption. Of the seven trials with published results, all pricing arms were effective in increasing consumption of fruits and vegetables, among other promoted items. Of the three trials that measured the effects of some type of behavioral strategy separately (e.g., education, communications), two were effective in increasing healthier food consumption. Unexpectedly, one of these trials also found that price reductions alone and behavioral strategies alone increased consumption of sugar sweetened beverages. Of the three trials that measured the interactive effects of pricing and behavioral strategies, none found that effects in the combined group were greater than pricing alone.

Weight status

Only three of 11 trials measured effects of interventions on weight status, and none of them found any intervention effect compared with control.

In summary, pricing interventions were effective 100% of the time in increasing the purchase of and consumption of healthier foods (i.e., fruits and vegetables), while behavioral change strategies were not. Additionally, it does not appear that combined interventions had greater effects than pricing alone, but more research is needed in this area. These conclusions are consistent with findings by Epstein et al (2012) and An (2013), who summarized experimental research on the relationships between price changes and food purchasing. In developed countries, low socioeconomic status is associated with obesity (Swinburn et al., 2011). Only five of 11 trials targeted low-income shoppers, who would likely be the recipients of policy-driven price changes. Only four of the trials were in the U.S. and none of the U.S.-based trials tested the interactive effects of an adjunctive therapy with price changes (i.e., factorial trials). Lastly, none of these trials tested the impact of price changes in small food stores, which operate with higher food costs and smaller economies of scale, and whose customers are likely more price-sensitive (Andreyeva et al., 2010; Budd et al., 2015). *Pricing interventions, with and without adjunctive interventions, are needed in small food stores.*

2.5. SUPPLY AND DEMAND FOR HEALTHY FOOD IN SMALL STORE SETTINGS

Food preferences cannot improve in the absence of supportive food environments (Franco et al., 2008). Conversely, improvement of the food environment will not elicit sustained improvements in the food environment if there is no demand for these healthy foods. African American and low-income individuals tend to eat fewer servings of vegetables and fruits, and higher amounts of fat and sugar than those of other ethnicities and higher incomes (Casagrande et al., 2009; Dubowitz, 2008). Prior formative work with small storeowners in Baltimore and New Orleans has found perceived low customer demand as the primary reason for not stocking fresh fruits and vegetables and other healthy items (Bodor et al., 2010; Gittelsohn et al., 2007). However, interviews with customers of those same stores indicated a high demand for those foods (Bodor et al., 2010; Gittelsohn et al., 2007). Similarly, store personnel in a recent Baltimore-based supermarket study cited that organic meats did not sell in the store because shoppers were not interested in healthy eating. The shoppers explained that organic was desired but unattainable because they were twice the price of conventional meats (Zachary, Palmer, & Surkan, 2012).

Cost barriers are at least partially responsible for the perceived lack of consumer demand for healthy food in the local food environment, as cost is one of the most important factors influencing purchasing decisions (Glanz et al., 1998). Food variety in local corner stores is often limited by stocking decisions based on perceived demand (Gittelsohn et al., 2007). Prices of foods in small stores are generally higher compared to supermarket prices due to lower purchasing volume at suppliers. *Store-based*

interventions should involve higher levels of the food supply chain to address consumer cost barriers as well as storeowner barriers to stocking healthy and/or perishable foods.

2.6. FOOD INDUSTRY'S ROLE IN OBESITY REDUCTION

The last section of this literature review presents an overview of current government regulation of 'Big Food'[2], self-regulatory efforts, and novel strategies to improve consumer behavior, including the role of trade promotions. At the current time, regulation of the food industry comes in two forms: 1) traditional regulatory approaches, such as banning junk foods in specific settings (i.e., schools), taxing candy and sodas, and requiring calorie labeling content in food venues, or 2) self-regulatory approaches by the food industry, whereby food companies make public pledges to protect public's health (Sharma, Teret & Brownell, 2010).

2.6.1. GOVERNMENT REGULATION OF 'BIG FOOD'

The Healthy, Hunger-Free Kids Act of 2010 required the USDA to issue regulations that aligned school meal standards with the 2010 Dietary Guidelines for Americans. Part of this policy included the USDA's 'Smart Snacks in Schools' program. Beginning in 2014, this program set mandatory limits on the fat, sugar, and salt content of competitive foods (e.g., foods not part of the USDA schools meals program), including branded vending machine items and snacks in a la carte lines. It also required that competitive foods include more whole grains, low-fat diary, fruits, vegetables, and lean protein. As a result, chocolate cookies, candy, and regular soda were replaced by light

[2] 'Big Food' refers to multinational food and beverage companies with the largest concentrated market power (PloS Med, 2012). The 'Big Ten' are Nestle, PepsiCo, Unilever, Mondelez (formerly Kraft), Coca-Cola, Mars, Danone, Associated British Foods (ABF), General Mills, Kellogg's (OxFam, http://www.behindthebrands.org/en/about)

popcorn, baked chips, fruit cups (in juice, not syrup), and zero calorie flavored waters (The State of Obesity, 2015).

Another policy that directly affects the food industry is vending and menu labeling (part of the 2010 Affordable Care Act) (Novak & Brownell, 2012). All vending operators that have more than 20 machines (by December 2016), are or will be required to post calorie counts for items offered (The State of Obesity, 2015). Mandatory labelling in the Netherlands, South Korea, the U.S. (re: trans-fats), and New Zealand was reported to have led to reformulations by the food industry (Hawkes et al., 2015). Thus, not only does food labeling influence consumer purchasing decisions directly among some groups, but it creates the incentive for food manufacturers to improve the nutrient profile of their foods (Hawkes et al., 2015).

Policies such as mandatory food labeling and 'Smart Snacks' have succeeded in increasing the availability of better-for-you snacks and beverages, while simultaneously reducing the availability of unhealthier products in schools and vending machines. *Similar policies or self-regulatory initiatives are needed to increase the ratio of better for you foods and beverages in small food stores in low-income areas.*

2.6.2. SELF-REGULATORY EFFORTS

At the current time, the food industry is largely self-regulated and based on voluntary participation (Ronit & Jensen, 2014). While many groups have criticized self-regulation as a ploy for companies to delay government intervention, a well-grounded self-regulatory system is less adversarial to the public, and is more cost-effective, flexible and timelier than government regulation (Sharma, Teret & Brownell, 2010).

Employing this strategy could partially shift the responsibility for consumers' health from federal and local policy to the food suppliers who serve these individuals (Sharma et al., 2006). On the other hand, self-regulation allows industry to determine its own pledges or guidelines, which often lack transparency and thus, lead to low standards, non-compliance and overall ineffectiveness (Ronit & Jensen, 2014; Sharma, Teret & Brownell, 2010).

The largest and most visible pledges of these voluntary efforts have been made by Healthy Weight Commitment Foundation (HWCF), a group of 16 major food-manufacturing companies[3] who pledged to collectively sell 1.5 trillion fewer calories by 2015 (Mozaffarian, 2014). An independent evaluation by Ng M. et al (2014) (and funded by the Robert Wood Johnson Foundation) (2014) found that the HWCF met and exceeded their interim 2012 sales reduction pledge of consumer package goods (CPGs) by 6.4 trillion calories (or 78 kcals per person/day) compared to the baseline year of 2007. Researchers found that the mechanisms to this change could be explained by creating and marketing lower-calorie formulations of existing products, creating new products, reducing package sizes, selling off high-calorie brands, and acquiring lower-calorie brands (Ng M. et al., 2014). However, an accompanying paper by the same authors reported that declines in CPGs were already occurring in pre-pledge trajectories (2000-2007) (Ng M. et al., 2014). This leads some public health researchers to doubt the meaningfulness of the HWCFs pledge (Mozaffarian, 2014; Ng, Slining & Popkin, 2014).

[3]The sixteen HWCF companies include: Bumble Bee Foods; Campbell Soup Company; ConAgra Foods; General Mills; Kellogg Company; Kraft Foods; Mars; McCormick; Nestlé USA; PepsiCo; Post Foods/Ralston Foods; Sara Lee; Coca-Cola; Hershey; J.M. Smucker; and Unilever.

Mozaffarian (2014) notes that before the pledge, US calories sold were already declining by 1 trillion calories per year, and that when the 2010 pledge was made, the companies would have been fully aware of these secular trends.

Two other self-regulatory initiatives geared towards children, including front-of-package labeling of CPGs and food advertising, also failed to meet established self-regulatory standards (Brownell & Koplan, 2011; Powell, Schermbeck & Chaloupka, 2013; Roberto et al., 2011;). Inadequate results of the industry-driven initiatives, such as the HWCF and others, suggest the need for public involvement in order to ensure that standards are met and are rigorous enough to improve consumer choices. For example, governments can strengthen industry-led initiatives by establishing clear and measurable objectives, and providing independent evaluation that could improve the accountability and credibility of private sector efforts (Swinburn et al., 2015). Additionally, there is a great need to 'level the playing field' among food industry stakeholders, which is unlikely to happen under a voluntary effort, where some companies agree to meet standards (i.e., limiting food advertising to children) and their competitors do not. In fact, one of the recommended actions in the Lancet series was to ensure that industry or policy-led initiatives 'sign agreements that create fair opportunities between competitors' (Huang et al., 2015). *Industry-led self-regulatory efforts to increase healthier food availability can be strengthened by independent evaluation and agreements with other competitors to 'level the playing field'.*

2.7.3. PROMISING STRATEGIES TO IMPROVE CONSUMER FOOD BEHAVIOR

Consumer packaged goods (CPG) account for almost two-thirds of the calories (Ng et al., 2014) Americans consume, thus, however involved in obesity-related initiatives, the food and beverage industries must be a part of the conversation (Wansink & Peters, 2006). Wansink & Peters (2006) provide two ways that food industry can help de-market obesity that would benefit both companies and consumers. The first method is through single-serving packaging. Reducing the per-occasion consumption of a product could help consumers better control the volume of food intake, but also could help enhance favorable attitudes towards the brand (and thus, encourage repeated purchase) (Wansink & Peters, 2006). Nabisco's line of 100-packs, designed to provide consumers with tasty, better-for-you products, was a financial success and led Kraft to reach $100 million in sales in less than a year (Wansink & Peters, 2006). Research has shown that individuals eat less of a product if there is an obvious natural stopping point, which can be done by dividing a large container into smaller units (Wansink & Peters, 2006). Smaller packages that reduce the per-occasion caloric intake by 100 calories can make a difference - reducing calories by 10% can reverse weight gain among most Americans (Wansink & Peters, 2006).

The second method is through 'stealth health', whereby silent changes to existing food products are made without the consumers' knowledge. The rationale for these types of changes stem from the negative consumer response to food products that taste 'new' and are advertised as 'healthy', and therefore expected to taste bad (Wansink & Peters, 2006). Research has shown that consumers eat the same volume of

food when the caloric density is decreased, by using water, air, or fiber-rich foods like fruits and vegetables (Wansink & Peters, 2006). Reducing the caloric content of an existing food while keeping the same volume helps to maintain the perception of 'value' by customers that are price-sensitive, as opposed to smaller packaging appealing to portion-sensitive customers. 'Stealth health' may be a more effective strategy for lower income consumers, who are more price sensitive.

Studies indicate that industry-led initiatives, such as the HWCF, to reduce calories through portion size reductions, reformulation, and marketing have resulted in superior sales and profit growth (Cardello et al., 2014). Within a five year period (2006-2011), companies that grew their lower-calorie product lines increased total sales while companies that did not recorded a decline in sales (Cardello et al., 2014). Furthermore, lower calorie products among HWCF companies accounted for 52.5% of total sales and 99% of the sales growth (Cardello et al. 2014). 'Better-for-you' or lower calorie foods may not be considered 'healthy' by many public health scientists, but they can provide the calorie reduction needed in long-term weight loss and they also may help 'retrain' consumers' taste preferences towards healthier products (Wansink & Peters, 2006). At the very minimum, we must recognize that individuals that snack daily on potato chips and soda are probably not going to substitute them with broccoli, but perhaps they will substitute them with lower-calorie baked chips and beverages, which over time could lead to significant calorie deficit and subsequent weight loss. The same industry mechanisms used to increase food sales and profits can be leveraged to shift consumer

choices to be healthier. *The last mechanism that has been overlooked and under researched is the use of trade promotions, which is at the crux of this thesis.*

2.6.3.1. THE ROLE OF MARKETING & TRADE PROMOTIONS

Food marketing is often singled out as a leading cause of the obesity epidemic, but very little, with the exception of television advertising, is known on how it influences consumption (Chandon & Wansink, 2012). What if marketing was used to shift consumer preferences towards healthier products instead of unhealthy ones? Chandon & Wansink (2012) provided an in-depth review of mechanisms by which food industry could meet business objectives while helping people eat healthier. The review integrated literature from marketing and consumer research and included ways that marketing is negatively and positively influencing consumer behavior, and 'win-win' considerations for the future. Such considerations include 'quantity' promotions for healthy foods (e.g., buy one salad, get a second half off), 'advertising' promotions (e.g., positioning healthier foods in movies and video games), 'branding' promotions (e.g., adding licensed characters onto produce packaging), product development (e.g., developing foods that accelerate satiation but taste good), food quantity (e.g., elongating packages to make portions look larger), and food convenience/access (e.g., placing water and lower calorie drinks in the front and center of coolers, and sugar-sweetened beverages in less convenient spots) (Chandon & Wansink, 2012).

The Chandon & Wansink review (2012) alludes to the potential role of trade promotions to increase healthy food preferences without explicitly stating so. The CPG sector spends approximately $75 billion per year on trade promotions, compared to

advertising expenditures of $37 billion (Poddar & Donthu, 2011). Despite industry spending more on trade promotions than on any other marketing activity, academic researchers know the least about them and the potential they hold to shift consumer preference (Gomez, Maratou & Just, 2007; Poddar & Donthu, 2011). Sales promotions, or marketing activities undertaken to increase sales of a certain product, occur as two types; either trade or consumer sales promotions. Trade promotions refer to the marketing activities between manufacturers and retailers/wholesalers, as opposed to being directed to the final consumer. The central reason for the dearth of research regarding these promotions is the extreme difficulty in obtaining data, which companies regard as confidential and proprietary (i.e., 'trade secrets') (Gomez et al., 2007; Poddar & Donthu, 2011). Trade promotions lead to increased sales in the short run, and often in the long run (Maxwell, Gilmore, Gallagher & Falls, 2012; Poddar & Donthu, 2011). Manufacturers hope that some of the promotion is passed on by retailers to consumers as a price discount, which encourages trial of a product (Poddar & Donthu, 2011). Additionally, manufacturers use trade promotion to compete with other brands (Poddar & Donthu, 2011). As long as the increased sales are greater than the increased costs, trade promotions benefit the manufacturer (Poddar & Donthu, 2011). In a simplistic sense, retailers can benefit from trade promotions in two ways: 1) buying at discounted prices and selling at normal prices, or 2) increasing their sales when they pass on the savings. Some commonly employed trade promotions are found in **Table 2.2**.

Table 2.2. Trade promotion examples

Name of promotion	Definition	Example
Slotting Allowance	Money paid up front to obtain a certain placement on store shelves.	$25,000 per item (supermarket) for an end-cap display
Buy-Out Allowance	Money paid for the removal of goods to clear shelf space for your product.	The retail value of the goods removed
Movement Allowance	Money paid for manufacturers' goods sold by the retailer during a specific time period.	$4 per case sold in 1 month
Performance Allowance	Money paid to the retailer for a requested activity by the manufacturer.	20% discount off the cost of the promotional item when retailer displays the good and features it in a circular
Introductory Allowance	Money paid to the retailer when purchasing an item for the first time	5% per case for the first order

Reference: The Basics: The Business of Specialty Foods. National Association for the Specialty Food Trade. New York. 2009.

The presence of trade promotions in small food stores, at least in Baltimore City, is scarce. To our knowledge, provision of beverage coolers by the manufacturer is the only substantial food supplier promotion, (e.g., Pepsi), whereby a certain percentage (generally 80%) of the cooler must be stocked with their branded products (unpublished data, BHRR). In baseline surveys with 24 participating stores, only two stores received cardboard product displays and two stores received a small discount (5%) off of the purchased product, and these promotions were given to promote chips and SSBs (unpublished baseline data, BHRR). Conversely, tobacco trade promotions are heavily

utilized in our sample's small stores, consistent with other small store literature (John, Cheney, & Azad, 2009). During in-depth interviews, one of our storeowners reported, "They [tobacco companies] pay me 25 bucks a month, just to have their signs up. You see what I mean? You know, I mean, that's why we promote their products because we get the money off of them; and other products, we don't get no money off of, so we don't really care." (unpublished data, 2/21/12). The storeowner stated that only tobacco companies provided promotions to this scale, and that food trade promotions were reserved for bigger stores. *Trade promotions used to facilitate the stock and sales of foods in small stores, are infrequently utilized by food suppliers*.

Research with food stores located in food deserts found that marketing strategies that prominently displayed and discounted high-sugar, high fat foods were strongly associated with a higher body mass index (BMI) among customers (Ghosh-Dastidar et al., 2014). The use of trade promotions by food companies to instead promote their lower calorie or 'better-for-you' product lines is a novel approach with considerable potential as a public health nutrition strategy, and could be instituted more rapidly than policy-driven pricing initiatives (i.e., subsidies). Manufacturers utilizing trade promotions on their healthier food products could increase the demand for these foods in small, urban food stores, and simultaneously decrease the demand for unhealthy ones via substitution (reduced-calorie SSBs vs regular SSBs). *The goal of this thesis is to test the effect of trade allowances, via performance-based incentives and communications, on small store stocking and sales, and wholesale stock of promoted healthy foods.*

2.7. CHAPTER SUMMARY

The nation's alarmingly high obesity and chronic disease prevalence falls disproportionately on lower-income minorities, thus, targeted public health interventions are needed to reduce health disparity and inequity gaps. In low-income urban areas, small stores are a predominant food source and store-based programs have seen moderate success in regards to healthier food stocking and sales. There is inadequate research on the effects of price manipulations on consumer food behaviors in small store-based settings, which operate with higher food costs and smaller economies of scale, and whose customers are likely more price-sensitive. Policy-driven healthy food ('thin') subsidies and unhealthy food ('sin') taxes are viable public health strategies, but have been slow to come to fruition because of industry opposition. However, the widespread use of food industry trade promotions to increase product sales suggests that targeted food pricing holds considerable potential as a public health nutrition strategy. Trade promotions (i.e., slotting allowances, performance-based incentives) are underutilized by food suppliers to promote the stock and sales of their products in small urban stores. I propose the use of such promotions on healthier food products in order to increase healthier food demand, and to decrease unhealthier food demand (via substitution). In this dissertation study, I test the effect of wholesaler-to-retailer price incentives, with and without communications strategies, on healthier food stocking and sales in small Baltimore City food stores. I also evaluate the wholesale-level intervention implementation through process evaluation measures. This approach

supports the notion that the food industry can be constructive in fighting the obesity epidemic, while at the same time, meeting corporate goals.

CHAPTER 3. METHODS

This chapter focuses on the methods specific to this dissertation study, including store and wholesaler-level: recruitment procedures, setting descriptions, and formative research methods; intervention development and implementation; data collection and analyses; and data collector training and ethical considerations. The terms 'retailer' and store-owner' are used interchangeably in this thesis, as are 'consumer' and 'customer', and 'small store' and 'corner store'.

3.1. THESIS STUDY OVERVIEW

The BHRR study was a 2x2 randomized controlled trial supported by the National Heart, Lung & Blood Institute at the National Institutes of Health (Grant #1R21HL102812-01A1; PI: Joel Gittelsohn). The project spanned from June 2011 to March 2014 in several phases, including one year of formative research and intervention development, six months of baseline data collection, six months of intervention implementation and process evaluation, and five months of post-intervention data collection. The overarching goal of BHRR was to develop, implement, and evaluate a multilevel pricing and communications trial to increase access to and promote healthier alternatives to non-nutrient dense foods and beverages as a means of addressing obesity among low-income urban residents of Baltimore City. The trial took place in 24 small corner stores located in low-income census tracts throughout Baltimore City and in two local food wholesale stores that serve those retailers. The main study aims for the parent BHRR trial included 1) formative research with wholesalers, stores, and consumers to develop appropriate intervention strategies, 2) implementation and

process evaluation of the intervention at the store- and consumer-levels, and 3) impact of pricing and communications strategies on consumer purchasing, dietary intake, anthropometry measures, food source use, and food security, and store-level stock and sales of promoted foods and related psychosocial factors.

This dissertation study focuses on wholesale and store-level outcomes, specifically evaluation of the wholesale-level intervention implementation, and impact of pricing and communications strategies on store-level sales, stock, and prices of promoted foods and associated psychosocial factors. Additionally, the first (of 3) papers introduces an innovative pricing approach commonly used by food industry to increase product sales and profits, but not previously utilized by public health research to increase the supply and demand of healthier foods and beverages.

3.1.1. TIMELINE

The first two phases, Formative Research and Intervention Development, including development and pilot testing of intervention materials and data collection instruments, served to provide a solid foundation for delivered intervention components and evaluation. The methods and summary of findings for these phases of the study will be discussed briefly in this chapter, though manuscripts of this research are beyond the scope of this thesis (Kim et al, under review). Phases 3 - 5 of the study are the primary foci of papers 2 and 3, and are discussed in further detail. The thesis study activities and timeline within the context of BHRR is outlined below.

Table 3.1. BHRR study phases and activities

Phase	Dates	Thesis-related Activities	Additional BHRR Activities
Phase 1: Formative Research	Jan-Oct 2012	• Interview Guide Development • Storeowner in-depth interviews • Small store observations • Wholesale store observations • Participant (retailer) observations • Store recruitment • Initial meetings with wholesale owner • Wholesaler in-depth interview*	• Interview & Focus Group Guide Development • Customer in-depth interviews • Customer focus groups • Qualitative Data Analysis & manuscript preparation (consumers/storeowners)
Phase 2: Intervention Development	Apr 2012-Feb 2013	• Store &Wholesale-level Instrument Development • Intervention materials development • Planning meetings with wholesale staff-pricing component • Data collector training • Instrument pilot testing & revisions • IRB submission	• Consumer-level Instrument Development • Intervention materials development & pilot testing • Data collector training • Instrument pilot testing & revisions • IRB submission
Phase 3: Baseline data Collection	Apr-Dec 2012	• Storeowner surveys • Wholesaler surveys* • Wholesaler meetings • Database building • Storeowner baseline data entry	• Consumer recruitment • Consumer surveys • Database Building • Consumer baseline data entry
Phase 4: Trial implementation	Feb-Aug 2013	• Store Randomization • Intervention Implementation • Wholesaler meetings • Process Evaluation (store/wholesaler) • Instrument revisions • IRB submission	• Interventionist Training • Intervention Implementation • Process Evaluation (consumer) • Store-owner process evaluation in-depth interviews • Instrument revisions • IRB submission
Phase 5: Post-intervention data collection	Nov 2013 - Mar 2014	• Storeowner surveys • Wholesaler Process Evaluation • Store-level Intervention exposure evaluation	• Consumer surveys • Data entry (Process Evaluation-consumer)
Phase 6: Data Entry, Cleaning, and Analysis	Mar 2014-Mar 2015	• Database building • Data entry • Process and impact analysis	N/A
Phase 7: Dissertation writing and Dissemination	Mar 2015-Jan 2016	• Dissertation preparation • Manuscript submissions	N/A

*Not used in the final thesis study evaluation

3.1.2. CONCEPTUAL FRAMEWORK

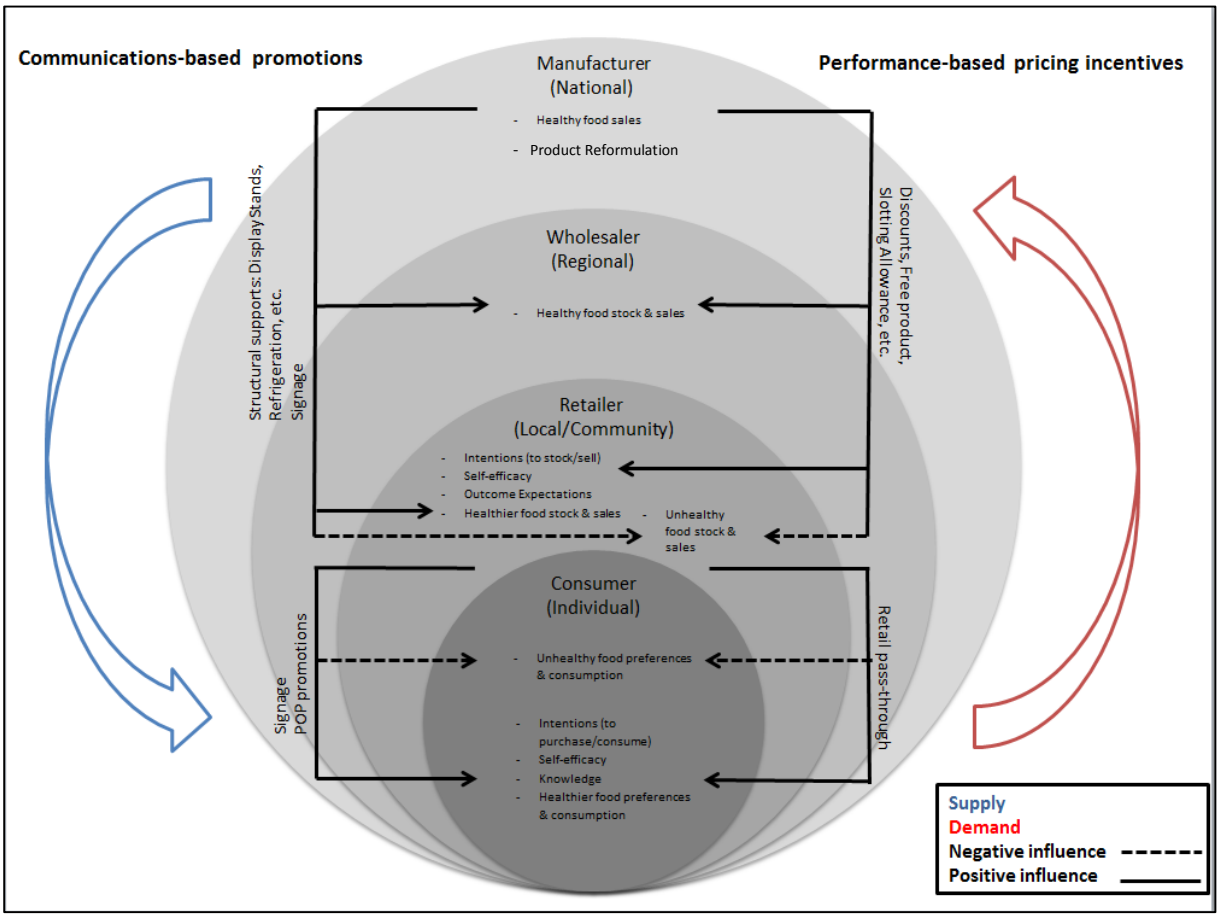
This project's guiding theoretical framework was based on Social Cognitive Theory (SCT) (Bandura, 1986), the Social Ecological Model (SEM) (Bronfenbrenner, 1977), and economics' law of demand. The first two theories use institutional/environmental, community, and individual-level factors, to help explain the

complex and multidirectional relationships between consumers (individual-level), retailers (local/community level), and food suppliers (regional/national levels). Both theories stress the importance of targeting intervention strategies on not only the individual but also on his or her surrounding environment to create sustained change. For example, health messaging geared towards consumers to elicit food behavior change will have little success if retailers do not have the infrastructure (i.e., refrigeration) to stock healthier foods or if target foods are not affordable at store suppliers. SCT and SEM have been utilized previously in several store-based studies (Gittelsohn et al., 2012). Economics' law of demand states that as the price of an item decreases, the quantity demanded for that item will increase, if all other factors remain the same. However, as reviewed in the previous chapter (Ch.2), demand for foods depend on several factors, such as consumer price sensitivity or the availability of close food substitutes. The conceptual framework (**Figure 3.1**) illustrates how the pricing and communications intervention, using SCT, SEM, and the law of demand, was theorized to increase both supply and demand of healthier foods at the wholesale, retail, and consumer levels. In a real world setting, trade promotions (i.e., performance-based incentive) for healthier foods would be initialized by the manufacturer (instead of initialized at the wholesale-level as in the case of the BHRR study) and would serve two purposes, to: 1) develop brand loyalty and generate revenue and 2) promote healthful food choices and satisfy self-regulatory or policy-driven requirements.

On the right side of the framework, performance-based incentives for healthier foods and drinks, such as slotting or movement allowances for low-calorie soft drinks or

baked chips, are directed from the manufacturer to either a regional wholesaler or retailer. Simultaneously, the manufacturer supplies the communications materials/structural supports (i.e. display stands, signage, beverage coolers) to support the sales of healthier foods and beverages (left side of Figure). The supply of healthier items increase (blue arrow) in both wholesale and retail stores as a result of both pricing and communications supplier promotions. Consumer-directed promotions, via signage/communications at the store-level and/or discounts passed through to consumers, are hypothesized to result in an increase in sales of the healthier products. This in turn, improves consumer psychosocial factors associated with the purchase and consumption of healthier foods, such as intentions to purchase healthier items and self-efficacy to choose healthier options. As storeowners notice an increase in consumer purchase of healthier items, their psychosocial factors are hypothesized to increase, including outcome expectations to sell healthier items, and self-efficacy and intentions to stock and sell healthier foods. As retail purchases of healthier foods/drinks increase at regional wholesalers, the demand (red arrow) for healthier products increases at wholesale-level and higher. Increased demand from wholesalers for healthier products and government pressure to manufacture 'better for you' foods/drinks is hypothesized to spur product reformulation by national-level manufacturers. As the supply of healthier items continues to increase, the ratio of healthier items to unhealthier items will also increase (at wholesalers & retailers), further encouraging the stock and promotion of foods at the store-level and the purchase, trial, and consumption of healthier foods by consumers. Replacement of unhealthy options with healthier ones is

hypothesized to occur, along with eventual food norm shifts and consumer preferences for healthier foods. Continued product sales at manufacturer, distributor/wholesaler, and retail levels and improved consumer dietary behaviors create a 'win win' for all levels of the framework.



Wholesalers include local Cash & Carry stores and larger, state-wide distribution centers serving Cash & Carry stores
Retailers include small food stores, chain convenience stores, supermarkets, and prepared food sources

Figure 3.1. Conceptual model for the dissertation/BHRR study

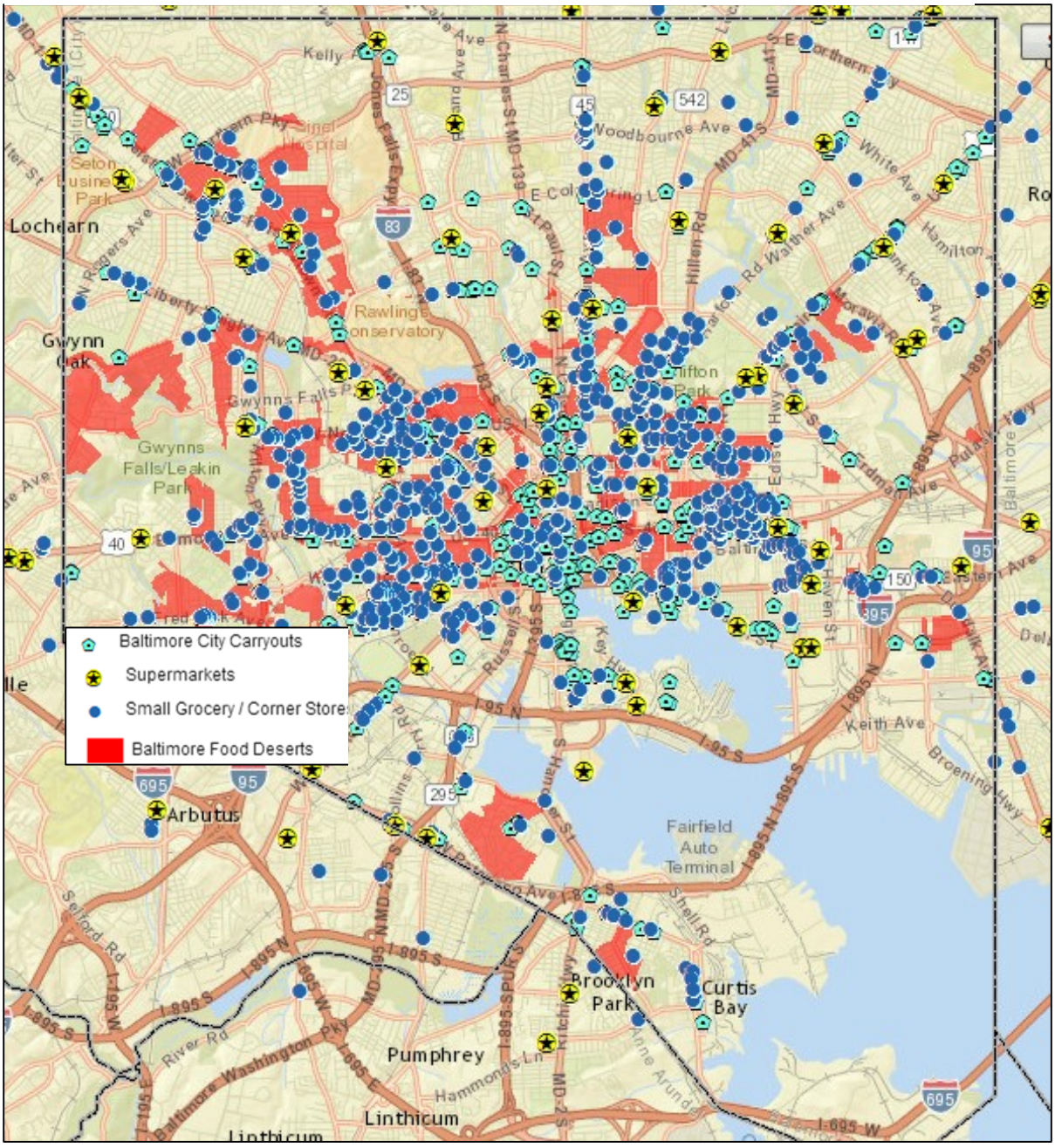
3.2 STUDY SETTING AND RECRUITMENT

3.2.1. SETTING

Baltimore is the largest city in the state of Maryland and is 40 miles northeast of the District of Columbia and 30 miles northwest of Annapolis, MD. It borders the

northern edge of the Chesapeake Bay and was once a major international seaport and manufacturing hub, but de-industrialization after World War II precipitated a dramatic decline in population, employment, and income. Baltimore's unemployment rate is 8.6%, and almost one quarter of residents and 34% of children live below the poverty line (U.S. Census Bureau, 2014). Of Baltimore's 622,793 residents, 63.1% are black, 31.6% are white, 4.7% are Latino, and 2.7% are Asian (U.S. Census Bureau, 2015). Baltimore has had a complex and troubled history, with a culmination of events that have led to stark differences in race/ethnicity, income and education level, health status, and food availability between neighborhoods, even between those that border each other. This study took place in small corner stores in low-income, predominantly black neighborhoods of Baltimore city. Many of these neighborhoods are considered 'food deserts', or more appropriately named 'food swamps' because of the sheer quantity of convenience-type food stores and carry-outs that are found there. According to the Maryland Food System Map, as of 2015, there are 704 carry-outs, 960 convenience-type food stores, including 652 'corner' stores, and only 52 supermarkets (Maryland Food System Map, 2015). **Figure 3.2** shows the distribution of stores concentrated in food desert/swamp areas.

Figure 3.2. Distribution of food retail stores in Baltimore City



Source: Maryland Food System Map, 2015

Table 3.2 lists sociodemographic characteristics of clusters of neighborhoods surrounding the stores that participated in the study. This data is taken from the Baltimore City Health Department's Neighborhood Profile, which reports data on 55 Community Statistical areas or clusters pooled together from over 200 neighborhoods in

Baltimore City (Ames et al., 2011). On average, neighborhoods surrounding corner stores are 87% African American, almost half of households earn less than $25,000 a year, 68% of residents have a high school diploma or less, and average life expectancy is 67 years old.

Table 3.2. Characteristics of neighborhoods surrounding participating corner stores

Neighborhood Location	# of stores	% African American	Median Household Income	% Households earning	Unemployment Rate	% Families below the poverty line	% with HS diploma or less	Homicide rate	Carry-out Density	Corner Store Density	Grocery Store Proximity by bus	Life expectancy at birth (years)	Treatment Group
Mid way/Coldstream	3	96%	$30,068	45%	21%	23%	74%	46	20	21	13	64	2,2,3
Jonestown/Oldtown	1	76%	$20,515	56%	15%	27%	64%	30	22	7	19	71	3
Greater Rosemont	2	97%	$28,007	44%	16%	21%	67%	48	15	15	10	67	2,3
Madison East End	2	91%	$30,389	41%	14%	28%	68%	46	24	26	8	65	3,4
Sandtown-Winchester	3	97%	$22,277	56%	21%	31%	76%	45	14	20	6	65	1,3,4
Southwest Baltimore	2	76%	$27,158	45%	20%	26%	70%	44	24	26	8	65	1,2
Upton/Druid Heights	2	94%	$13,388	67%	18%	49%	72%	38	16	12	1	63	2,4
Westport/Mt.Winans /Lakeland	1	66%	$37,678	30%	15%	12%	73%	27	25	8	6	69	2
Greenmount East	3	94%	$20,708	57%	20%	38%	76%	40	11	28	11	66	1,3,4
Upton/Druid Heights	1	94%	$13,388	67%	18%	49%	72%	38	16	12	1	63	1
Allendale/Irvington/ South Hilton	1	89%	$33,112	38%	15%	15%	67%	22	7	7	8	69	1
Poppleton/The Terraces/Hollins Market	1	84%	$25,167	50%	11%	19%	58%	30	22	14	17	64	1
Perkins/ Middle East	1	87%	$18,522	57%	18%	28%	66%	61	35	11	8	68	4
Greater Mondawmin	1	97%	$34,438	37%	10%	12%	62%	31	12	11	11	70	4
Neighborhood sample averages	**N/A**	**87%**	**$26,147**	**48%**	**16%**	**26%**	**68%**	**38**	**18**	**15**	**9**	**67**	**N/A**
Baltimore City averages	**N/A**	**64%**	**$37,395**	**33%**	**11%**	**15%**	**53%**	**21**	**13**	**9**	**12**	**72**	**N/A**

Source: Ames, A., Evan M., Fox L., Milam A., Petteway R., Rutledge R., 2011 Neighborhood Health Profile: Baltimore City. Baltimore City Health Department, December 2011.

3.2.2. SMALL STORE RECRUITMENT

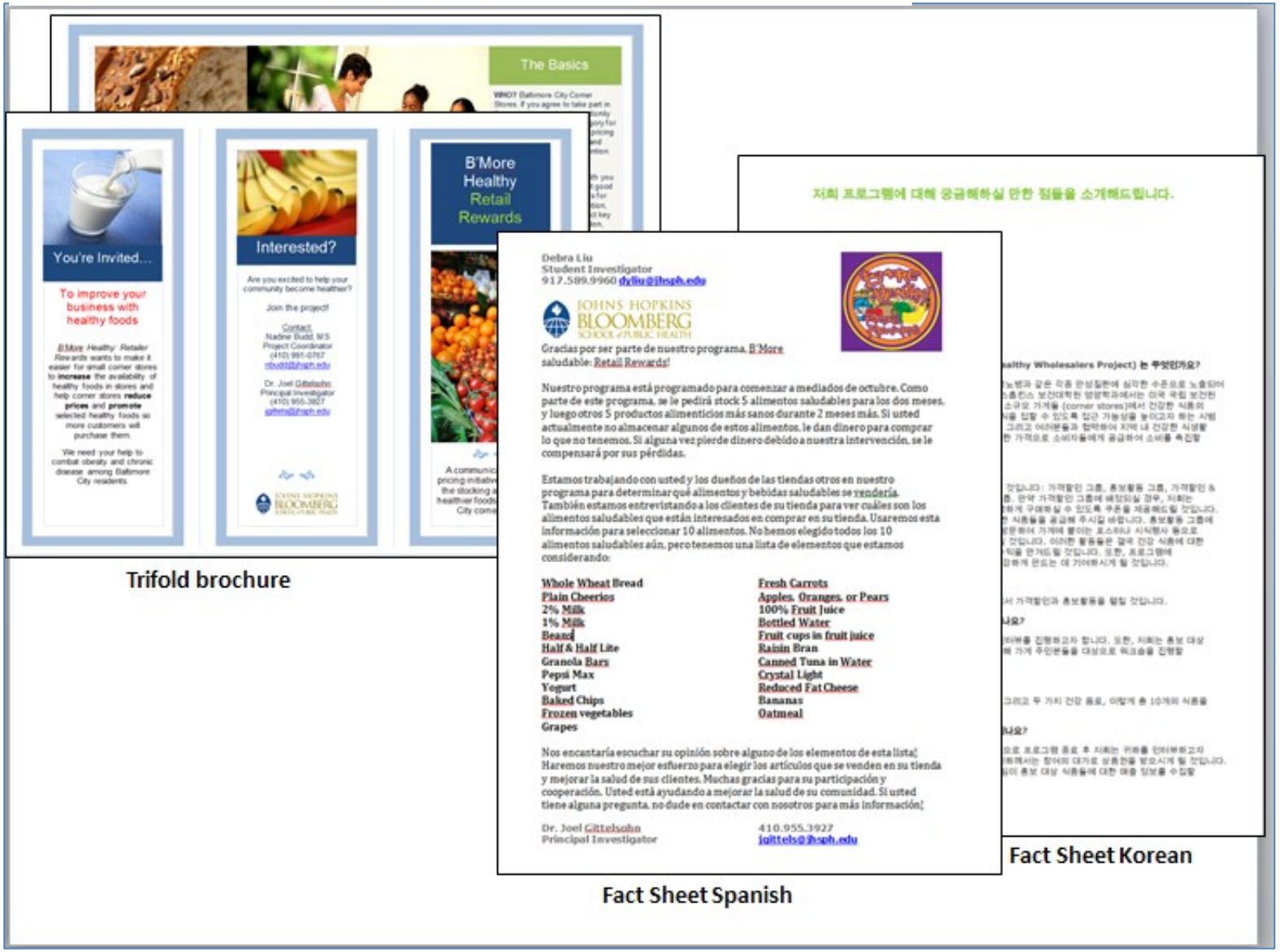
Store recruitment occurred in October-November, 2012. Inclusion criteria for stores included: 1) located in a low-income census tract and where greater than 75% of residents self-identified as African American, 2) purchased at least $5,000 from the wholesaler in the previous year, 3) did not participate in past Healthy Store projects, and 4) were located at least ¼ mile from one another. The Maryland Food System Mapping project staff, part of the Johns Hopkins Center for A Livable Future, provided GIS maps and a list of stores that fit eligibility criteria. Research staff visited stores from the list in person during the week. In order to control for possible clustering of store features by geographic area between East and West regions of Baltimore, staff attempted to recruit similar numbers from each region. Staff used Martin Luther King Blvd to designate census tracts into East and West Baltimore. Staff approached storeowners, explained the purpose of study, and handed a brochure and fact sheet explaining frequently asked questions and answers about the program. Many small stores are owned and operated by Korean Americans; these storeowners were approached by Korean-speaking research staff and were given Korean translations of brochures and FAQ sheets. If the storeowner was not there, or if storeowners were unsure if they wanted to participate, staff revisited the store at a later date. Before a store was recruited, staff confirmed that the storeowner used the participating wholesaler (either location) regularly and was not within ¼ mile from another recruited store. An excel document was used to track recruitment process with any relevant notes and was updated after each session.

Figure 3.3 and **Figure 3.4** contain example store log and recruitment materials, respectively. In the log, Y=Yes, N=No, C=Closed/boarded up, F=Follow-up.

Figure 3.3. Store recruitment log

Address	East/West	Y/N/F/C	Stores within 0.25 mile (if Y/F)	Date visited	Who visited	Ethnicity	Wholesaler	Notes
2000 W. Lafayette Ave.	West	N	None	2/11/2012	Ahyoung & Jayne			The address does not exist
1543 Popolar Grove St.	West	F	Johns Confectionary, S&S food r	2/11/2012	Ahyoung & Jayne	Spanish		Store name has changed - Family deli & grocey. Owner was not ther
3939 Edmonson Ave.	West	N		2/11/2012	Ahyoung & Jayne	Korean		The owner said he would call us back if interested, but it really seem
501 N. Denison St.	West	N		2/11/2012	Ahyoung & Jayne	Korean		Store name change - Denison food market. Strong "no."
190 S. Kossuth St.	West	N		2/11/2012	Ahyoung & Jayne	Korean		The owner was nice and kind of interested in healthy foods, but he s
2830 S. Hanover St.	South	N		2/11/2012	Ahyoung & Jayne			It's not a cornerstore at all..
3603 W. Caton Ave.	West	F	A-1 food market (same name bu	2/8/2012	Ahyoung & Jayne			Owner was not there. He said he would show our brochure to boss a
200 N. Monatery Ave.	West	Y	A-1 food market (both)	2/8/2012	Ahyoung & Jayne	Korean		Recruited. More info in our recruited store spreadsheet.
2600 Hollins Ferry Rd.	West	N		2/8/2012	Ahyoung & Jayne			
4123 Frederick ave	West	N		2/8/2012	Ahyoung & Jayne			
2344 Annapolis Rd.	West	Y		2/8/2012	Ahyoung & Jayne	Korean		The store name has been changed - "young's mini market"
20 S. Hilton St	West	N		2/8/2012	Ahyoung & Jayne			It's a big supermarket, not a corner store.
1701 WESTWOOD AVE	West	Y	PENN NORTH MINI MART; PENN	1/9/2012	Jayne & Divya	Korean		Approachable, nice
3200 NORMOUNT AVE	West	N	none	1/9/2012	Jayne & Divya	Korean		asked to bring Korean-speaking student next time. STORE DROPPED
2747 HARLEM AVE	West	Y	FOOD CITY EXPRESS; CHINO EL (	1/9/2012	Jayne & Divya	AA		interested but wanted to make sure with wife. Window-order
1647 N PATTERSON PARK	East	C		1/10/2012	Jayne & Divya			boarded up
840 N CHESTER ST	East	N	MURRY'S; HERNANDEZ; SUN	1/10/2012	Jayne & Divya			sketchy area, no longer called Slick's
2332 E HOFFMAN ST	East	N	BURGOS DELI	1/10/2012	Jayne & Divya			group of men hanging outside of store, started walking towards car unsafe
1436 HOLBROOK ST	East	N	CENTRAL CARRYOUT & GROCERY	1/10/2012	Jayne & Divya			weird. Had sign outside that said "open" but store was locked.
1501 BANK ST	East	Y	none	1/10/2012	Jayne & Divya	Korean		Laid-back, interested/skeptical
1407 E FAYETTE ST	East	Y	none	1/10/2012	Jayne & Divya	Chinese		nice
1205 GREENMOUNT AVE	East	Y	OK GROCERY; SUNRISE GROCER'	1/10/2012	Jayne & Divya	Korean		Interested--likes the idea about helping with diabetes
900 N BROADWAY	East	Y	GRANDPA'S FOOD MARKET	1/10/2012	Jayne & Divya	Spanish speaking	B Green	Good english, Laid-back, easy-going.
946 W LEXINGTON ST	West	C		1/11/2012	Jayne & Divya			torn down
1328 W LANVALE ST	West	C		1/11/2012	Jayne & Divya			drove by address - nothing there
2322 W FAYETTE ST	West	C		1/11/2012	Jayne & Divya			was locked/closed; unsure if permanently
300 N. STRICKER STREET	West	C		1/11/2012	Jayne & Divya			boarded and locked
1950 W LANVALE ST	West	F	Lanvale Grocery; Edmondson Fo	1/11/2012	Jayne & Divya	AA, but not American		Left info with employee who didn't speak English. Window-order, sn
900 BENNETT PL	West	N		1/11/2012	Jayne & Divya	AA (Caribbean accent?)		declined quickly, no reason
1729 W LANVALE ST	West	N		1/11/2012	Jayne & Divya	Chinese		only speaks Chinese
1851 W FAYETTE ST	West	N		1/11/2012	Jayne & Divya	Korean		no English. Don't recruit due to proximity to New Fayette
805 W LEXINGTON ST	West	Y	none	1/11/2012	Jayne & Divya	Korean	B Green; Jetr	window order. Bring korean speaking student next time
1956 W. FAYETTE STREET	West	Y	TIFFANY'S MART; MARIQUITA D	1/11/2012	Jayne & Divya	AA	B Green	very excited and interested
2701 W NORTH AVE	West	C		1/12/2012	Jayne & Divya			boarded up
1800 THOMAS AVE	West	C		1/12/2012	Jayne & Divya			boarded up - entire block boarded up
300 N CAREY ST	West	F	YOUNG'S GROCERY STORE; YUN'	1/12/2012	Jayne & Divya			left info, quick interaction. Window-order, very small. Not a great sp
1049 N MOUNT ST	West	N		1/12/2012	Jayne & Divya			didn't leave info - more of a carry-out than grocery
1900 N BENTALOU ST	West	N		1/12/2012	Jayne & Divya	Korean		hesitant, skeptical. Don't recruit - proximity to Walbrook
13 S FRANKLINTOWN RD	West	Y	We Can Do It (Milrose Grocery);	1/12/2012	Jayne & Divya	AA		very interested
2000 WALBROOK AVE	West	Y	S & J GROCERIES (READY DISCOI	1/12/2012	Jayne & Divya	Korean	B Green	Likes price discount idea a lot
1801 E BIDDLE ST	East	C		1/13/2012	Jayne & Divya			boarded up. We drove by a "Biddle Grocery" at another address but remember location
2438 E LAFAYETTE AVE	East	C		1/13/2012	Jayne & Divya			closed, looks like for good

Figure 3.4. Store recruitment materials



If the store was eligible for the study and the owner was willing to participate, the store was enrolled, until staff recruited all 24 stores. Staff approached 102 stores for participation in the study; 20 stores were boarded up/closed, 34 refused to participate, 16 asked staff to return when the owner was there, and 32 initially agreed to participate and out of those, eight later dropped out of the study. The final refusal rate was 51% ((34+8)/82), and the final response rate was 29% (24/82). Of the 24 final stores, 13 were located in pre-defined food desert areas, 11 were WIC-approved (carrying fresh fruits and vegetables, low-fat milk and cheese, whole wheat bread), 6 were behind-the-glass stores (characterized by Plexiglas walls separating customers from retail items and store employees), 12 stores were Korean-owned and 8 were African American-owned. **Figure 3.5** shows the BHRR participating retailers overlying low-income and food desert/swamp areas in the city.

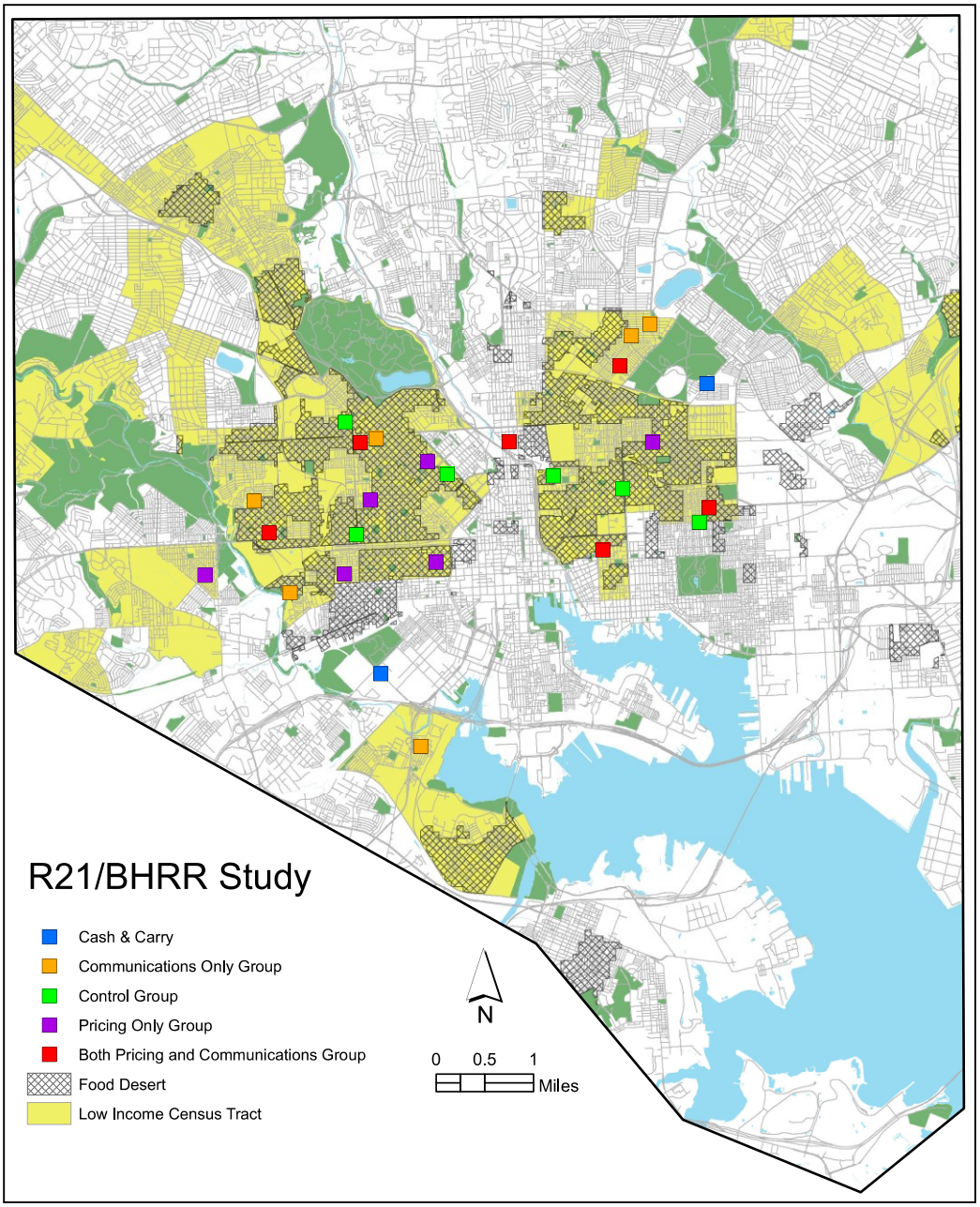


Figure 3.5. Map of BHRR stores and wholesalers

3.2.3. RANDOMIZATION

After baseline data collection, stores were randomly allocated to one of four treatment groups: communications only (n=6), pricing only (n=6), combined communications/pricing (n=6), or control (n=6). To ensure comparison of groups with

similar characteristics, store groups were stratified by two levels: WIC status and daily sales volume. A cutoff of 20 unit sales of promoted items per day was used to differentiate between large and small sales volume. Sales volume was used as a proxy for daily sales revenue, since storeowners were reluctant to share monetary estimates with research staff. Similarly, WIC status was used as a proxy for healthy food stocking, since stores carrying WIC must have a minimum required stock of healthy foods at all times. Thus, stratification occurred 4 ways: high volume stores with WIC; high volume stores without WIC; low volume stores with WIC; low volume stores without WIC.

Store randomization occurred in a Baltimore City recreation center where volunteers from the community drew store names from a bowl for one stratified group at a time (i.e. high volume WIC stores, etc.), so that the first drawing was assigned to Group 1 (pricing only), the 2nd drawing was assigned to Group 2 (communications only), the 3rd drawing was assigned to Group 3 (combined), and the 4th drawing was assigned Group 4 (control). This step was repeated with each stratified group until all stores were assigned a treatment group (**Figure 3.6**).

Neither study participants nor research staff were blinded to the treatment arms due to the nature of the intervention design.

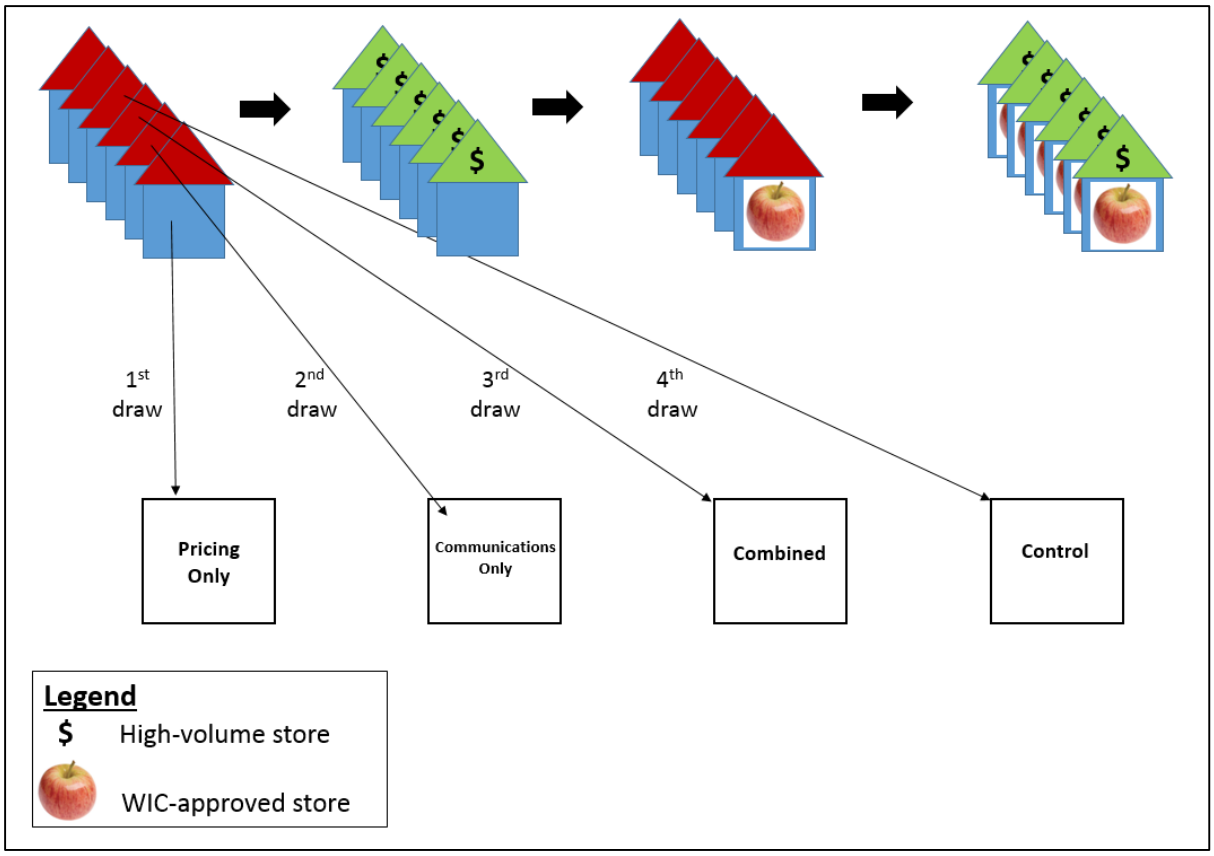


Figure 3.6. Stratified random allocation of corner stores

3.2.4. SMALL STORE DESCRIPTIONS

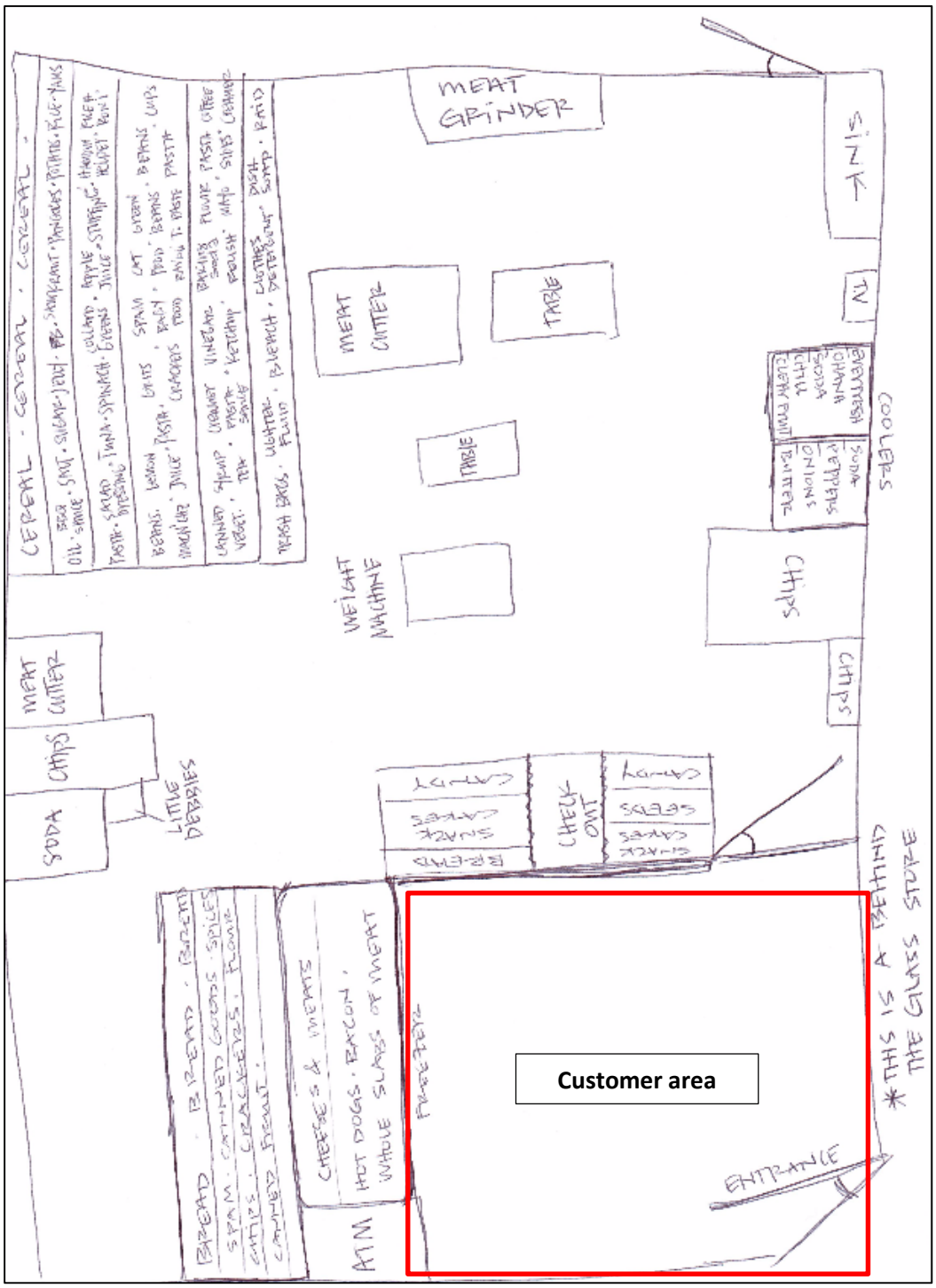
The stores in the sample are not part of larger grocery chains and are individually owned and operated. There are a few overarching consistencies among most corner stores in Baltimore City including that most have Plexiglass securing the employee from the customers (some 'buzz' people inside instead), they accept SNAP, the owner is the operator and shopper for the store (at least half of the time), and the majority of food sales come from snack foods. For sake of brevity, longer descriptions are provided for a sample of three stores involved in the study. A summary table highlighting baseline characteristics for 24 small stores is given in Chapter 4.

Figure 3.7. Photos of exterior, interior, and checkout counter of sample corner stores.

Store example #1

Store # 1 is a Grp 2 (Communications Only) store in a residential neighborhood in Greater Rosemont **(Figure 3.8).** This is a behind-the-glass store, where Plexiglass walls separate the customer from the employees and the food items. There are menu boards and items lining the walls, so customers know what is available, but most of the items cannot be seen. This store is owned by an African American man in his mid to late 40's with a calm and kind demeanor. His main business is selling fresh deli meats, similar to a butcher or deli. He typically has one employee tending to the customers while he cuts and prepares the meat orders. Aside from selling meats, he operates as a typical corner store. This store does not accept WIC, does not sell alcohol, and does accept SNAP.

Figure 3.8. Store Map #1



Store example #2

Store # 2 is Grp 1 (Pricing Only) intervention store in a quiet neighborhood in Southwest Baltimore and deviates from the norm of what an average corner store stocks and sells

in Baltimore City. The owner is an African American man that sees himself more as a chef/caterer than a store owner. He is originally from the neighborhood (but has lived on the west coast before moving back) and lives next door to the store, typical of many storeowners. Outside on the street, there are planter boxes where he plants zucchini, peepers, and herbs when the weather is warm. He shops regularly at farmers' markets and incorporates the produce into his carryout menu for customers. The store setup is similar to other corner stores, with the option to buzz customers into the building or to interact with them instead with a Plexiglass rotating turnstile that faces the outside of the building **(Figure 3.9)**. He serves hot foods, breakfast sandwiches, deli sandwiches, and locally distributed (Zeke's) coffee. His sister tends the checkout counter and he prepares the foods for customers. The bulk of the store space is stocked with unprepared foods typically seen in the corner store, but he has a few unique items generally not found in corner stores (i.e., soymilk, tofu). This store does not accept WIC (but stocks many WIC-approved items), does not sell alcohol, and accepts SNAP.

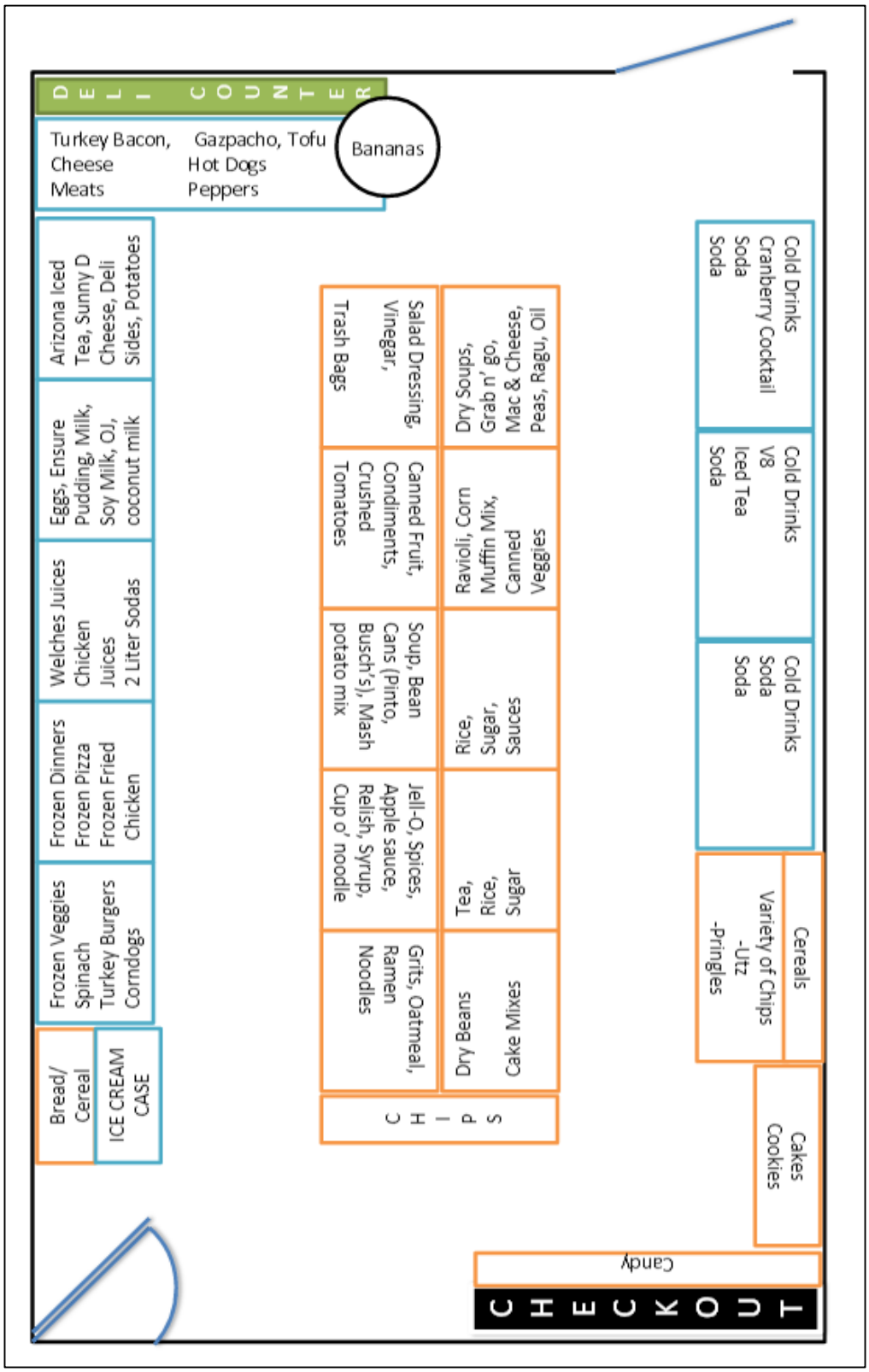


Figure 3.9. Store Map #2

Store example #3

Store # 3 is a Grp 4 (Control) store in Greenmount East, on a busy street lined with commercial businesses **(Figure 3.10)**. The owner is a friendly Korean American man that does not speak much English. He usually has one other employee working with him. The store is a large, open store, but the employees are separated by Plexiglass from the customers and the employee area runs the length of the right side of the store. Money and items are exchanged through a Plexiglass turnstile. This store sells deli sandwiches and was WIC-approved at the start of the study, but was fined for not having one of the items and lost its license. The store does not sell alcohol and accepts SNAP.

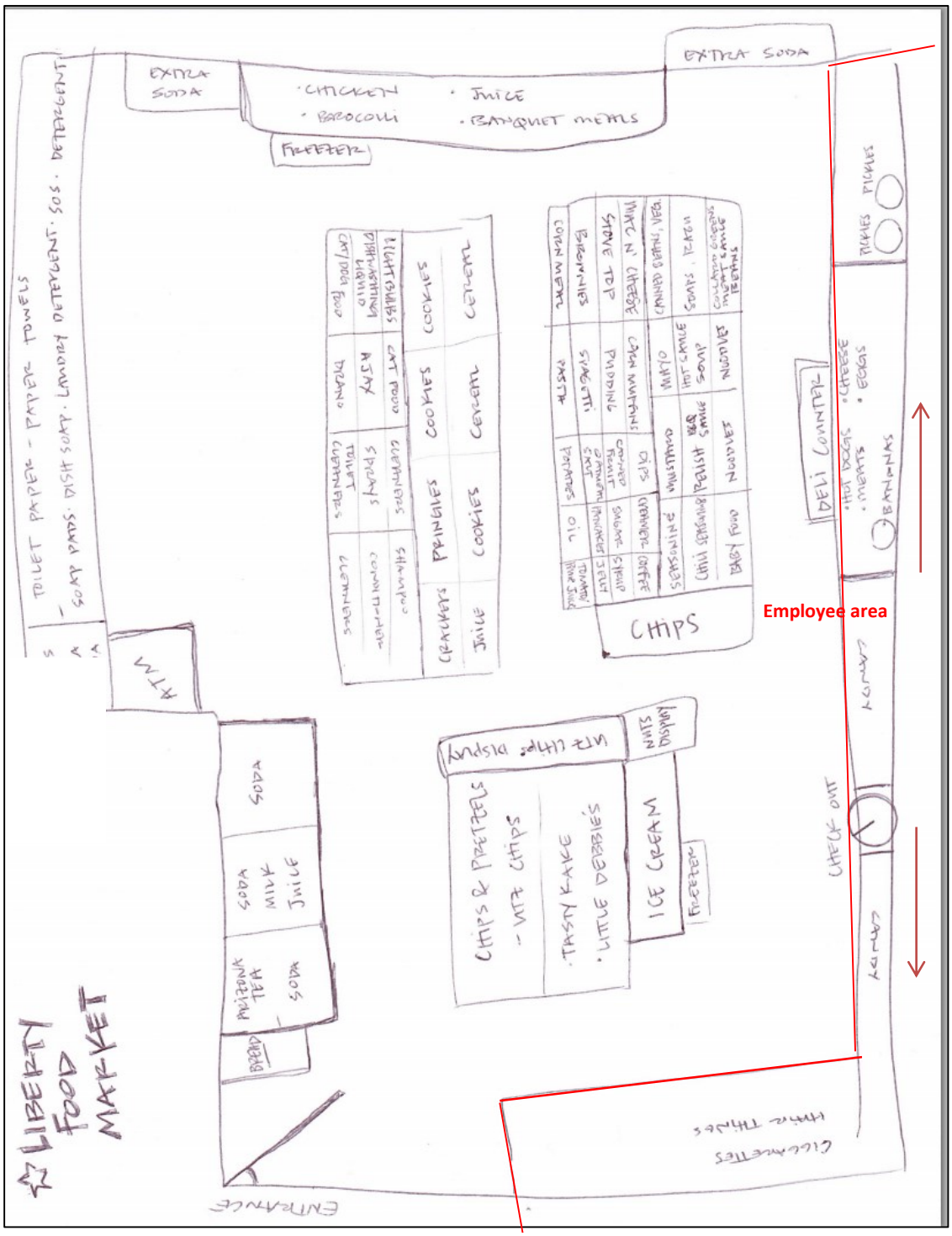


Figure 3.10. Store Map #3

3.2.5. WHOLESALER RECRUITMENT

Three wholesale stores located within city limits serve Baltimore City corner stores. B. Green Cash & Carry has one store on the eastside and another store in the southwest part of the city. Jetro Cash & Carry (also called Restaurant Depot) is part of a national chain of stores with a local branch in the southwest. At the study's initiation, Jetro declined requests to participate in the study. Sam's Club is located outside of city limits and was not considered for the study. A third store, MD Cash & Carry, was recruited in early stages, however, closed for business before the intervention began. As such, we were only able to recruit one wholesaler (B.Green) with two stores. The owner of the wholesaler has a vested interest in the health of the surrounding community and agreed to take part in the study in the grant-writing stage of the project.

3.2.6. WHOLESALER DESCRIPTION

B. Green is a full-service food wholesaler focusing on the small retailer (e.g., non-chain corner stores or carryout restaurants) with over $50 million in annual sales. The wholesaler has warehouses where customers can pick up items, as well as direct delivery service. The stores carry over 5,000 items, including National Brands (Deer Park, Pepsi, Perdue), private labels (Richfood), and regional items (Esskay, Rutters, Utz, Everfresh). Small storeowners represent 90% of B. Greens clientele, while the other 10% are foodservice customers.

Both east and west stores are located in industrial sections of the city. Adjacent to the east side store is Food Depot, a local supermarket chain owned by BGreen. The

Cash & Carry on the west side sits by itself off of a busy road **(Figure 3.11)**. This store is the bigger of the two, and supplies goods for the east side store, as well as for the trucks delivering goods to individual retailers. The corporate headquarters is located on the top floor of the west side store. Both warehouse interiors are similar to a Sam's Club, except it is more sterile, without consumer-directed advertisements or soft lighting. Aisles are formed by stacks of pallets throughout the store, separate rooms for freezer and refrigerated items, and a separate checkout room with registers. The temperature is cold inside year round. Customers use big flat dollies to stack boxes of items. There are simple signs that advertise a low price or sale, and bi-weekly circulars that can be picked up upon entering the front of the store.

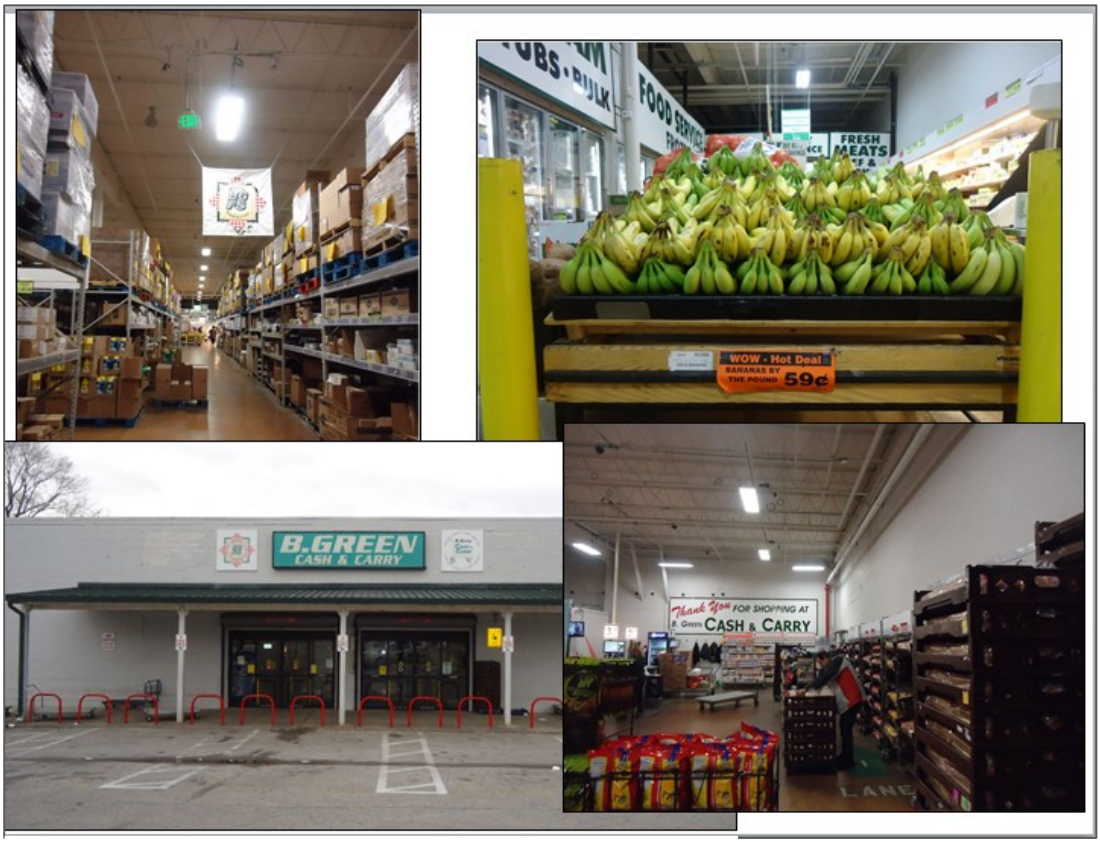


Figure 3.11. Interior/exterior of wholesaler

3.3. DATA COLLECTION

This section focuses on data collection pertaining to the *store* and *wholesale-level* outcomes (Aims 2&3). The first journal paper (Aim 1) reviews additional methods pertaining to the consumer sample and is not covered in this section as consumer methods are not germane to this dissertation. Store- and wholesale-level formative research is not evaluated in thesis papers, but is summarized in the next section as it informed the intervention study**.** Data collection instruments by aim and time point are shown below.

Table 3.3. BHRR evaluation instruments used for dissertation

	Baseline	**Interim**	**Post**	**Follow-up**
Aim 1: Study protocol & intervention design				
N/A				
Aim 2: Wholesale-level process Evaluation				
Wholesaler Process Evaluation Form	X	X	X	X
Sales Data (from wholesaler databases)			X	
Storeowner Exposure Form			X	
Aim 3: Store and storeowner impact evaluation				
Store Impact Questionnaire (SIQ)	X		X	

3.3.1. INTERVENTION DEVELOPMENT AND IMPLEMENTATION

The entire BHRR intervention program lasted approximately 6 months, from February to August 2013. An overview of pricing and communications intervention components can be found in **Table 3.4**.

Table 3.4. Description of intervention components & phases

Description of BHRR intervention components & phases								
Phase	**Weeks**	**Objectives**	**In-store communications examples (12 stores)**					**Wholesale Discounts (12 stores)**
			Interactive Displays & Taste Tests	**Educational Handouts**	**Posters**	**Shelf labels & talkers**	**Giveaways**	
1: Better Beverages	10 Feb-April 2013	(1) Lower calorie drink alternatives (2) Replace soda with water (3) Switch to low-fat milk	'Rethink your drink!' Blind taste tests of popular drinks and lower sugar/fat alternatives	'How does your drink measure up?'	"Replace one bottle of XX with water each day to lose XX lbs per year!"	"Refresh!" "Re-energize!" "Refuel!"	Drink tumblers with BHRR logo	Deer Park Water – 25% Pepsi Next – 20% Coke Zero – 20% Rutter's 1% Milk – 20%
2: Healthier Essentials	8 Apr-June 2013	(1)Replace white bread with whole wheat (2) Use frozen vegetables to increase vegetable intake (3) Switch to tuna in water for a healthy lunch alternative	Banana-apple-whole wheat bread pudding samples & recipes No mayo tuna salad samples & recipes	'What's the difference between whole and refined grains?'	"The Value of Frozen Vegetables" (pick some up at your local corner store!)	"Fiber-rich!" "Wholey Delicious!" "Protein-Packed!"	Re-usable cloth grocery bags with BHRR logo	Essential Everyday frozen vegetables (all types) – 10% Hanover & Bird's Eye frozen vegetables (all types) – 20% 100% whole wheat bread – 20% Starkist & Bumblebee chunk light tuna – 10% Starkist & Bumblebee white albacore tuna – 20%
3: Low-fat Snacks	8 June-Aug 2013	(1) Replace sweets with lower sugar/calorie alternatives (2) Try baked potato chips instead of fried (3) Have fresh fruit for a healthy snack	'What's in your snack?' Baked chip taste test Fruit salad samples	'Easy and Quick Snacks 150 calories or less!'	'Fresh Fruit Sold Here!' 'Have a Snack Attack without the Fat!'	"Lowfat Snack Attack!" "Baked is Better!"	Produce refrigerator or freezer with BHRR logo (store-level) Baked Chip Clips with BHRR logo (consumer)	Utz Baked potato chips – 30% Quaker Oats 90 calorie granola bars – 15% Fresh fruit (apples, oranges, bananas) – 20%

3.3.1.1. Selection of promoted foods

Ten structured business meetings with the project coordinator, BHRR staff, CEO, and other wholesale executives (i.e., pricing, marketing, and IT directors) were conducted from October 2012 to March 2013 in order to refine foods for promotion and to implement the stocking of new promoted foods, to finalize the percent of price discounts of each item, and to develop a protocol for applying healthy food discounts to the 12 pricing stores. Meetings took place at corporate offices at the west side store location. A member of BHRR research staff recorded minutes and emailed them with action items and due dates to attendees following each meeting.

The final promoted food list was based on the results of consumer and storeowner formative work, availability from the wholesaler's suppliers, and price point **(Table 3.5)**. Initial efforts were made to stock/promote the item types and specific brands requested by consumers, however, this was not always possible. For example, Doritos is a high volume snack food item in the small corner store. B. Green attempted to obtain reduced fat Doritos in 1 oz packages (130 calories per bag), but was unable to get them from suppliers. Utz chips, also a high volume item, was available, but only in a slightly larger bag (1.125 oz) than snack size, making the baked chips at least 30 cents more expensive than the regular Utz snack size chip bag ($0.35 for 1 oz). Albacore tuna was an item requested by consumers, however retailers would not stock this item because they had to purchase a 48-pack costing $84.99 at the wholesaler (making it a 'high-risk' investment if all was not sold). B. Green was able to obtain an 8- or 12-pack from suppliers, but only after a 2-month delay. These seemingly small revisions created

regular program delays, as final food price agreements were negotiated by B. Green's food buyers and the various distributors for each new food or beverage item. Promoted foods and beverages were intended to replace non-nutrient dense items that were frequently purchased at corner stores (i.e., chips, cookies, sodas), at similar price points. Additional information on promoted food selection is found in Budd et al. (2015).

Table 3.5. BHRR Promoted foods and phases

Phase	Promoted Food/Beverage
Phase 1: Better Beverages	1% Milk
	Deer Park Water
	Pepsi Next*
	Coke Zero
Phase 2: Healthy Essentials	100% Whole Wheat Bread
	Chunk Lite Tuna in water (Bumblebee, Starkist)
	Albacore Tuna in Water (smaller size*)
	Bird's Eye Frozen Vegetables *
	Hanover Frozen Vegetables*
	Essential Everyday Frozen Vegetables
Phase 3: Low Fat Snack Attack!	Bananas, Apples, Oranges
	Quaker Oats low fat granola bars*
	Utz Plain or BBQ Baked Potato Chips*

*New item

3.3.1.2. Pricing Intervention

Development

BHRR grant funding was used to cover reduced costs of the selected foods to the 12 pricing intervention wholesale customers (storeowners). The wholesaler allowance was calculated based on projected units of promoted foods sold per week multiplied by

the number of weeks each unit was promoted. We predicted that $10,000 would be sufficient to cover the reduced costs at the wholesaler.

Discounts were to be applied at wholesaler registers each time promoted food purchases were made from February to August 2013. The discounts for each food/beverage item were determined by B. Green and BHRR staff based on a multitude of factors, including storeowner formative research findings, price at competing wholesalers (i.e., Sam's Club), cost of the promoted foods' unhealthier counterparts (i.e., baked chips vs. regular, coke zero vs. regular, low-fat granola bar vs. Sunbelt brand granola bar), and discounts applied in previous studies (Ball et al., 2011; Michels et al., 2008; Waterlander et al., 2013). Discounts ranged from 10-30% of the current retail price at the wholesale location. Discounts were staggered by phase, so that from February to April, only drinks were to be discounted, from April to June, phase 2 foods were added, and from June to August, all foods were to be discounted. A suggested small store retail price with a 35% profit margin was calculated using the wholesale discounted price for each promoted item **(Figure 3.12)**.

In exchange for the discounts, pricing intervention stores agreed to: 1) purchase the promoted foods from BGreen and stock them in their stores, and 2) pass the partial or full discount to their customers ("retail pass-through"). These storeowners were given a phase-specific laminated list of foods with the discounted prices, where they were located, suggested discounts to customers, and price labels for promoted items.

Figure 3.12. Wholesale price discount worksheet

Item	Brand	UPC	Pk	Size	Reg retail cost	% Discount	Disc. retail cost	Per pk discount	Per unit discount	Disc. unit cost	Notes	35% Profit margin (
Phase 1												
Deer Park Water	Deer Park		32	16.9 oz	$5.99	25%	$4.49	$1.50	$0.05	$0.14	Sam's is $4.49/32 ct	$0.22
Deer Park Water	Deer Park		24	16.9 oz	$5.39	25%	$4.04	$1.35	$0.06	$0.17		$0.26
Pepsi Next	Pepsi		24	20 oz	$18.49	20%	$14.79	$3.70	$0.15	$0.62		$0.95
Coke Zero	Coke		24	20 oz	$22.49	20%	$17.99	$4.50	$0.19	$0.75		$1.15
Coke Zero	Coke		6	20 oz		20%	$0.00	$0.00	$0.00	$0.00		$0.00
1% Milk	Rutters		1	quart	$0.85	20%	$0.68	$0.17	$0.17	$0.68		$1.05
1% Milk	Rutters		1	HG	$1.55	20%	$1.24	$0.31	$0.31	$1.24		$1.91
1% Milk	Rutters		1	G	$2.89	10%	$2.60	$0.29	$0.29	$2.60		$4.00
Phase 2												
100% Whole Wheat Bread	Schmidt's Old Tyme	7101012004	1	16 oz	$2.89	20%	$2.31	$0.58	$0.58	$2.31		$3.56
Bb Solid White Albacore in W	Bumble Bee	8660000005	48	5 oz	$84.99	20%	$67.99	$17.00	$0.35	$1.42		$2.18
BbChunk Light Tuna in Wate	Bumble Bee	8660000020	48	5 oz	$55.25	10%	$49.73	$5.53	$0.12	$1.04		$1.59
Bb Solid White Albacore in W	Bumble Bee		24	5 oz		20%	$0.00	$0.00	$0.00	$0.00		$0.00
Bb Chunk Light Tuna in Wate	Bumble Bee	8660000020	24	5 oz		10%	$0.00	$0.00	$0.00	$0.00		$0.00
Bb Solid White Albacore in W	Bumble Bee		8	5 oz	$13.99	20%	$11.19	$2.80	$0.35	$1.40		$2.15
Starkist Albacore in Water (E	Starkist		48	5 oz		20%	$0.00	$0.00	$0.00	$0.00		$0.00
StarKist Chunk Light in Wate	Starkist		48	5 oz	$54.99	10%	$49.49	$5.50	$0.11	$1.03		$1.59
Starkist Albacore in Water (E	Starkist		24	5 oz		20%	$0.00	$0.00	$0.00	$0.00		$0.00
StarKist Chunk Light in Wate	Starkist		24	5 oz		10%	$0.00	$0.00	$0.00	$0.00		$0.00
Starkist Albacore in Water (E	Starkist		12	5 oz	$17.89	10%	$16.10	$1.79	$0.15	$1.34		$2.06
EE Frozen Broccoli	Essential Everyday		1	16 oz	$4.99	10%	$4.49	$0.50	$0.50	$4.49		$6.91
EE Cut Corn	Essential Everyday		4	16 oz	$4.89	10%	$4.40	$0.49	$0.12	$1.10		$1.69
EE Green Bean	Essential Everyday		4	16 oz	$4.89	10%	$4.40	$0.49	$0.12	$1.10		$1.69
Bird's Eye Frozen Broccoli	Bird's Eye	1450001098	4	12 oz	$6.69	20%	$5.35	$1.34	$0.33	$1.34		$2.06
Bird's Eye Frozen Stir Fry Mec	Bird's Eye Pepper	1450050563	4	14.4 oz	$8.69	20%	$6.95	$1.74	$0.43	$1.74		$2.67
Hanover Corn	Hanover		4	16 oz	$8.99	20%	$7.19	$1.80	$0.45	$1.80		$2.77
Phase 3												
Bananas	Loose Bananas	27500000000	3	1 Lb (3 bananas)	$0.48	20%	$0.38	$0.10	$0.03	$0.13	3 for $1	$0.20
Navel Oranges	Navel Oranges	1162	10	4 Lb (10)	$2.59	20%	$2.07	$0.52	$0.05	$0.21	2 for $1, or buy 1 get 1 free	$0.32
Red Delicious Apples	Red Delicious Apples (#12)		10	4 lb (10)	$3.25	20%	$2.60	$0.65	$0.07	$0.26	2 for $1, or buy 1 get 1 free	$0.40
Gala Apples	Gala	859	10	3 Lb (10)	$3.95	20%	$3.16	$0.79	$0.08	$0.32	2 for $1, or buy 1 get 1 free	$0.49
Low Fat Granola Bars	Quaker 90 Cal	3000031186	8	6.72 oz (8)	$2.95	15%	$2.51	$0.44	$0.06	$0.31	At 35% profit margin, stores can se	$0.48
Baked Potato Chips	Utz	4178001230	1	1.125 oz	$0.49	30%	$0.34	$0.15	$0.15	$0.34	At 35% profit margin, stores can se	$0.53
Baked Potato Chips BBQ	Utz	4178001243	1	1.125 oz	$0.49	30%	$0.34	$0.15	$0.15	$0.34	At 35% profit margin, stores can se	$0.53

Implementation

Process evaluation of the wholesale-level pricing component proved difficult, because it relied on the wholesaler to provide sales and pricing data from their databases. Though wholesale staff verbally confirmed application of price discounts to the 12 pricing storeowners, we could not verify this, as 'discounted' prices were unmarked and wholesaler-generated reports were delayed and missing needed information. However, a cross-section of pricing and sales data from April 15-July 15, 2013 was received post-intervention. Process evaluation of the pricing intervention is discussed in detail in Paper 3. Additional price promotions, such as sales in weekly circulars, were monitored during bimonthly wholesaler visits to prevent contamination of the pricing intervention.

Implementation of the store-level pricing intervention was simpler, because prices of foods in stores were marked and could be assessed visually. Process evaluators visited all 24 stores twice monthly and recorded the price and availability of promoted food items on process evaluation forms.

3.3.1.3. Communications Intervention

Development

The in-store consumer-directed intervention was based on consumer and storeowner formative research and is described in Paper 1 and in Chapter 4. Materials were created by study staff and a graphic artist, and piloted in focus groups with

community members, as well as reviewed by a sample of storeowners, before implementation.

At wholesale stores, there were minimal store-directed communications in order to prevent cross contamination of pricing, communications, and control groups. Communications for these the 12 communications stores included a BHRR logo sticker affixed on the shelves above or adjacent to the promoted products **(Appendix E-1)**, a laminated list of foods **(Appendix E-2)** with locations, prices and added suggestions on how to promote the foods in their stores using BHRR materials (i.e., shelf talkers, bags, etc.). Research staff developed storeowner-directed communications using Microsoft Publisher and PowerPoint software programs.

Implementation

Process evaluators visited wholesale and small stores twice monthly and assessed the stock and visibility of promoted foods, the presence and placement of communications materials, and other relevant contextual factors. In addition to process evaluation forms, staff recorded journal entries for each small store after visits that included anecdotal information (i.e., storeowner concerns or comments, etc.).

Each communications' store (n=12) received the following:

- *Shelf Talkers* (laminated signs) attached to the shelf below the promoted product to draw the customer's attention.
- *Wall Posters* encouraging healthier food choices by phase.
- *Price Tags* placed under or adjacent to the promoted items.
- *Push/Pull sticker*, with BHRR logo, for the front door.
- *Open/Closed Sign,* with store hours and BHRR logo, for the front door.
- *Plastic Shopping Bags,* with BHRR logo, for consumer purchases (given to storeowner).
- *Small Refrigerator or Freezer* to help stock frozen or fresh fruits and vegetables.

Sample intervention materials by phase can be found in **Appendices A-E.**

Consumer-directed interactive sessions were also conducted in each of the 12 communication stores by trained interventionists based on objectives for each phase (i.e., replacing soda with water, switching to 1% milk). Lesson plans were made before each interactive session by study staff and included a list of supplies needed and tasks to be accomplished for that session. Each interactive session lasted approximately 2 hours and had 3 components: 1) an educational activity (i.e., taste test, game) or display (i.e., rethink your drink) for brief 1-2 minute interactions between interventionists and store customers, 2) an educational handout or recipe card to accompany the activity, and 3) a free giveaway related to the activity. During each interactive session, process evaluators recorded the number of customers that took part in the session (reach), the number of different intervention components that were delivered to each customer (dose delivered), and how well each intervention component was delivered (fidelity).

3.3.2. AIM 2 DATA COLLECTION

Aim 2 assessed wholesale-level implementation through process evaluation and also evaluated the impact of storeowner-directed intervention exposure on wholesale unit sales of promoted foods We modified established process evaluation constructs for public health interventions; *reach* - the proportion of target members (intervention storeowners) exposed to any component of the intervention, *dose delivered* - the number of intended units of each intervention component delivered (as a function of efforts of the intervention providers); *dose received* - the number of times each target member (storeowner) was exposed to any component of the intervention (to assess the

extent of engagement to intervention components), and *fidelity* - how well intervention components were delivered according to plan (Steckler & Linnan, 2002). A summary of process evaluation measures used for this study is provided in **Table 3.6.**

Table 3.6. Process Evaluation Measures

Process measure	Definition	Method
Reach (indirect)	% targeted stores that received any intervention	% of intervention storeowners that purchased ≥ 1 of the promoted foods (out of 18 intervention stores) % of any wholesale customer that purchased ≥ 1 of the promoted foods
Dose delivered	% of intended intervention components delivered by research staff to stores	% of time labels correctly marked promoted foods (out of all wholesale visits)
Dose received	% intervention components that storeowners report receiving	% of intervention storeowners who successfully recalled exposure to pricing or communications intervention components
Fidelity	How well intervention components were delivered according to plan	% of time promoted foods were stocked by wholesale stores % of time promoted foods discounted to pricing stores

Because intervention activities (i.e., price discounts, signage) were passive and research staff did not actively interact with storeowners for the wholesale-level intervention, an *indirect intervention reach* was determined by calculating the percentage of storeowners assigned to any intervention (n=18) that purchased at least one of the promoted healthier products (i.e., whole wheat bread, 1% milk) during the trial. Low reach was defined post hoc as 0% to 50%, moderate as 50% to 74%, and high as 75% to 100%. Additionally, we were able to determine total *indirect customer reach*

as the percentage of total different wholesale customers that purchased a promoted product during the intervention period out of total different customers (n=3,400) that used either wholesale store between February and August 2013. *Indirect customer reach* allowed us to calculate what percentage of customers bought a promoted product because it was available, even though they were not exposed to the pricing or communications components of the intervention. A minimum standard for total *indirect customer reach* was set at 5% of the total current customers, as defined in an earlier Baltimore study (Gittelsohn, Suratkar, et al., 2010).

Dose delivered was defined as the percentage of times communications materials were posted correctly by BHRR staff (i.e., price marked, logo present and correctly marking the item). High dose delivered was defined as correctly displayed materials at least 75% of the time, moderate dose delivered was defined as 50-74%; and low was 0-49%. *Dose received* was defined as the percentage of respondents who successfully recalled exposure to a variety of specific wholesale-level intervention components.

Fidelity was defined by how often the promoted food was stocked (% of times stocked) and how well the price discounts were passed on to the pricing intervention stores (% of times promoted foods were discounted). High fidelity was defined as having a mean availability frequency of 75% across all promoted foods, as defined in previous store-based interventions (Gittelsohn, Suratkar et al., 2010; Lee-Kwan et al., 2013). Moderate fidelity was defined as 50-74% frequency; while low was 0-49% (Gittelsohn,

Suratkar et al., 2010). We also used these percentages to indicate high, moderate, and low pricing fidelity for % of the time promoted foods were discounted.

Wholesaler Process Evaluation Form

The wholesale process evaluation form is shown in **Appendix H**. The wholesaler evaluation was completed at baseline, three times per phase, and at post-intervention for a total of 11 visits per wholesale store. The form collected information on stocking fidelity and dose delivered. For each promoted food, data collectors recorded the number of units stocked, price per unit, if the price was marked (yes/no), if the BHRR logo was present (yes/no), and if the BHRR logo was marking the correct item (yes/no). The process evaluator also provided additional commentary on contextual factors (e.g. visibility of items, quality of items, additional signage displayed by the wholesaler).

Storeowner Exposure Form

The Storeowner Exposure Form **(Appendix G)** assessed storeowner exposure to specific wholesaler intervention components and materials at one time point (post-intervention). Storeowners were asked if they noticed stock, labeling, and price decreases of individual promoted foods. They were also asked if they made any personal lifestyle changes as a result of BHRR materials. This form measured dose received.

Sales Data

At the conclusion of the trial, B. Green supplied study staff with a Microsoft Excel (2010) data file with the number of units of promoted foods sold from April 15 to July 15, 2013 by store name. Sales estimates were missing for Phase 3 foods (fresh fruit,

baked chips, granola bars) so total units sold were only provided for phase 1 & 2 foods. Wholesale sales records provided data on reach (intervention & customer), promoted food purchase frequency, and pricing fidelity.

3.3.3. AIM 3 DATA COLLECTION

Aim 3 evaluates the impact of the communications and pricing interventions on the store-level promoted food sales and stock, and storeowner psychosocial constructs towards the stocking and sales of promoted food items in 23 stores. Data was collected at two time points – baseline data collection occurred from December 2012 to January 2013 and post-intervention occurred from November 2013 to January 2014. Interviews were conducted by study staff and took approximately 1 hour and 15 minutes. Interviews with Korean-speaking owners were conducted in Korean and translated to English by Korean-speaking research staff. English versions of forms were used for all data collection.

Data Collector Training

Study staff completed the computer-based Collaborative Institutional Training Initiative (CITI) Program prior to data collection. Each data collector also participated in a 2-day training program, in which the following topics were reviewed: 1) human subjects ethics principles and procedures, 2) recruitment, sampling and consenting procedures, and 3) instruments and protocol for delivery. The Principal Investigator led the training for baseline data collection, and I led the training for post-intervention data collection. The Johns Hopkins IRB field guide was utilized as part of the training. Data

collectors were trained using a combination of lecture, role-play and supervised practice interviews.

Store Impact Questionnaire

The Store Impact Questionnaire (SIQ) was adapted from an instrument previously used in former small store interventions (Gittelsohn, Song, et al., 2010) and was piloted before baseline data collection **(Appendix F)**. The SIQ was administered to store owners to assess stocking and sales of promoted foods and beverages in the last 30 days, psychosocial constructs towards stocking and sales of promoted foods, and store characteristics that could mediate sales (e.g., special promotions, average number of customers per week). This instrument has been described in detail elsewhere (Budd et al., 2015).

3.4. DATA MANAGEMENT

Consent forms and the first page of data collection forms (which is separate from the data) have personal identifiers. The data and all forms with identifying information are stored in separate locked filing cabinets, and is only accessible by study staff. All forms with personal identifiers will be destroyed following completion of publication-writing. The research team kept daily data collection tracking logs. After each day of data collection, survey data was checked by a member of the research team for completeness and was returned to the data collector if incongruent data was found. After review and completion, survey data was entered in MS Access. I checked each survey data entry for errors. Once data was entered and checked in MS Access, I copied each Access page to a separate MS excel sheet. I then imported the excel pages to a

STATA® data file and merged them to create one STATA dataset. Outliers were checked and kept if correct, and revised if data entry error was found. Initial analyses included inspection of data distribution, distribution of residuals, and homoscedasticity, where appropriate. All datasets, .log files, and .do files are labelled appropriately and kept on the BHRR Dropbox site. Only the PI (Joel Gittelsohn), and 3 other research staff members (myself included) have passwords to this site.

3.5. DATA ANALYSIS

The purpose of Paper 1 was to describe the study design of the parent study BHRR. Since performance-based monetary allowances have not been utilized in a food store intervention previously, it was important to introduce this innovative approach in this first paper. This paper provides a foundation to analyze the effectiveness of such an approach and provide implications and suggestions for further use. As a protocol paper, there are no data analyses.

3.5.1. AIM 2 ANALYSIS

Descriptive statistics were performed using STATA 13.1 (STATA Corp, College Station, TX) and Microsoft Excel (2010) to calculate the proportion of responses for process evaluation measures (expressed as percentages).

3.5.2. AIM 3 ANALYSIS

STATA 13.1 statistical software package (College Station, TX) was used for all analyses; statistical tests were 2-sided with a significance level of $p \leq .05$.

Scale and Score Development

Each of the psychosocial constructs were assessed with 15 questions each, using a 5-point Likert scale that included: Strongly Agree (2), Agree (1), Undecided (0), Disagree (-1), Strongly Disagree (-2). Responses were summed to create the scale score for each category, with a scale range of -30 to 30 points. All scales were tested for internal consistency and obtained a Cronbach's alpha >0.70, which confirmed reliability.

To calculate the stocking score, 1 point was assigned for each type of promoted food present, with a score range of 0-15. For example, a store that stocked frozen broccoli, coke zero, bottled water, and fresh apples obtained a total stocking score of 4. Promoted unit sales were assessed with 15 questions and summed to create a daily total.

Baseline Differences

Baseline SIQ surveys were used to assess pre-intervention differences between treatment groups. Differences in baseline composite scores by treatment group were compared using Fisher's exact tests (for expected cell frequencies < 5) for dichotomous outcomes. One way analysis of variance (ANOVA) is normally used to compare continuous outcomes (means) across 4 treatment groups, however, due to the small sample size per group (n=6) and assumption violations (heteroscedasticity, non-normality), Kruskal Wallis H tests were used to determine differences between treatment groups. Means and standard deviations were reported from ANOVA tests for interpretation.

Intervention Impact

To evaluate the effect of interventions on storeowner psychosocial factors, and stocking and sales of promoted foods, linear generalized estimating equations with an independent correlation structure and robust standard errors were used to account for within-subject correlation over time. Outcome measures were analyzed as dependent variables with intervention group (Groups 1, 2, or 3), time, and a treatment*time interaction term as independent variables. The GEE model for intervention impact on promoted food stocking is shown below.

$$E[\text{stocking score}] = \beta 0 + \beta 1(\text{time}) + \beta 1(G1) + \beta 2(G2) + \beta 3(G3) + \beta 4(G1*\text{time}) + \beta 5(G2*\text{time}) + \beta 6(G3*\text{time}) + \boldsymbol{\varepsilon}$$

The treatment*time interaction term allowed examination of the difference in the change scores ('difference in differences') between intervention groups and control, much like using a change score variable as the outcome. Though randomization generally should balance treatment groups, this approach controls for time invariant differences between treatment groups that may occur and may not be detected due to small sample size.

STATA's *lincom* (linear combinations of estimators) command was used to test if the combined intervention (Grp 3) had a synergistic effect on outcomes compared to the additive effects of pricing (Grp 1) and communications (Grp 2) interventions. Post-hoc GEE analyses tested intervention impact on phase-specific stocking and sales promoted foods and psychosocial factors.

3.6. ETHICAL CONSIDERATIONS

There were no invasive procedures involved in data collection and/or intervention implementation. Intervention exposure did not pose risk, and there were no adverse health outcomes due to the program. The only risk with storeowners was perceived financial risk associated with stocking new foods. However, financial loss, if any, was small, as wholesaler stores stocked relatively small amounts of new foods and these foods were heavily promoted by our intervention. Moreover, the provided discounts should have offset losses.

As noted to participants in the consenting process, we skipped any questions that the respondent did not want to answer. All research protocols were reviewed and approved by the JHU Institutional Review Board. Participation was voluntary. Participants were required to sign a consent form that described the nature and extent of the study, risks, and benefits, prior to data collection.

3.7. FUNDING

This thesis was supported by the funding sources of the larger BHRR study. The primary source of funding came from the R21 exploratory grant from the National Heart, Lung, & Blood Institute at the National Institutes of Health (Grant #1R21HL102812-01A1). The Abell foundation provided funding to purchase structural incentives, including refrigerators and freezers, for communications' intervention corner stores to stock fresh or frozen produce. The Global Center on Childhood Obesity at Johns Hopkins (Eunice Kennedy Shriver National Institute of Child Health and Human

Development U54HD070725) provided additional support for post-intervention data collection, impact analysis, and report publication.

CHAPTER 4. FORMATIVE RESEARCH FINDINGS

This section reviews findings from formative research completed at the store- and wholesale-levels that played an integral role in creating the store and wholesaler interventions. Over one year (January 2012 to March 2013) of formative research with storeowners and wholesalers (and consumers) was completed prior to intervention implementation. In-depth interviews were recorded, transcribed, entered and coded using the Atlas-ti 7.0 textual data analysis software program. Separate semi-structured interview guides for storeowners and wholesalers were pilot-tested, revised, and IRB-approved prior to formative data collection. A review of store-level formative research methods is forthcoming (Kim et al., under review) and is beyond the scope of this dissertation.

4.1. STORE-LEVEL FORMATIVE WORK

In-store observations

Seventeen in-store observations of 44 shoppers were conducted. Results indicated that participants relied on corner stores for snack items (including beverages) and to restock household staple goods that were immediately needed (i.e., bread, milk, sugar). On average customers were in corner stores for less than 3 minutes, and travelled through a small portion of the store. Observations and store mapping highlighted several structural issues as significant barriers to purchasing healthful foods. During the observations it became clear that the way corner stores are designed encourages quick food purchases, and that most of the quickly accessible foods are

unhealthful. Observations and sketched store maps showed almost all checkout counters were surrounded by inexpensive, less healthful snack options such as chips, cookies, cakes, and candy. Observed shoppers almost never ventured beyond this checkout section, unless the drink coolers were elsewhere in the store.

Storeowner in-depth interviews

A total of 17 in-depth interviews (IDIs) were conducted at 15 stores. Two IDIs were held with both the husband and wife store owners. Some of the interviews were conducted as part of a Qualitative Research Theory & Methods class at Johns Hopkins School of Public Health and the rest were conducted by a Korean graduate student to fulfill degree requirements. Out of 15 storeowners, seven were Korean American, four were African American, and four were from Indian, Chinese, and Hispanic backgrounds. Seven IDIs were conducted and transcribed in Korean by the Korean graduate student, and transcripts were later translated to English for coding and analysis. Below is a summary of the major themes and findings shared among storeowners:

Table 4.1. Themes from storeowner formative research

Shopping & Stocking decisions
• Availability and price of items at wholesaler is the major limiting factor to stocking healthier items. • Even if customers want healthier products, storeowners often can't find them at the wholesaler (i.e., low-sodium products are often 'out of stock') • Storeowners generally shop at the wholesaler that is closest to their store. • Storeowners perceived a low demand for healthy foods and this was seen as a major barrier to stocking new, healthier items. • Some storeowners, who had received requests to stock fruits and vegetables refused to do so because it was a 'high risk investment'.
Customer purchasing decisions
• Taste and price, including price sensitivity, was a decisive factor behind food choice. Health concerns were also mentioned, but less frequently. • Storeowners believe that their customers prefer 'junk' foods and that it would be difficult to introduce healthier products with unfamiliar 'tastes'.

Table 4.1. Themes from storeowner formative research

- Some storeowners believe that customers are accustomed to the taste of unhealthy foods and it will be hard to initiate a shift in preferences towards healthier foods.
- Other storeowners believe that customers are unable to make healthier food purchases due to budgetary constraints and limited availability in stores.
- Customers comparison shop and have a great knowledge of local product prices.
- More customers are starting to ask for fruits and vegetables and are showing an interest in healthier foods.

Intervention suggestions

- Many storeowners did not believe that small stores have an influential role in changing customers' diets and suggested taking the intervention to larger grocery stores.
- Discounts need to be large enough for customers to change purchasing decisions.
- Storeowners suggested taste tests, free samples, and long-term communications exposure to facilitate permanent behavior change.
- Emphasis was on educational campaigns, based on the assumption that their customers lacked knowledge or personal motivation to eat healthy.

Price decisions

- Storeowners were concerned over providing temporary price discounts because customers would complain when it increased back to normal.
- Storeowners set prices depending on the price offered at wholesalers.
- Storeowners try to purchase items that are cheaper because of the price sensitivity of their customers.
- "Customers think in cents, not dollars." - Customers are extremely sensitive to price fluctuations so storeowners need to keep prices consistent.

Store Layout

- In stores where customers could access items, products were strategically placed to avoid theft.

Storeowner Ethos

- Many storeowners reflected a need to help customers beyond the business – sense of obligation to help the community was a central theme.
- There was a clear divide into two types of storeowners: 1) those whose main concern was maximizing profits, and 2) those who balanced profits with community service and customer welfare.

Source: Kim et al., under review (Ecol Food Nutr)

4.2. STORE CHARACTERISTICS

Information for store characteristics was acquired during the baseline data collection phase, using the SIQ instrument previously described in Chapter 3. **Table 4.2** provides baseline store and storeowner characteristics of the entire study sample.

Table 4.2. Baseline store and storeowner characteristics (n=24), % or M±SD

Storeowner characteristics	
Male	92
Storeowner race	----
Asian	71
African American	21
White	4
Storeowner ethnicity	-----
Hispanic/Latino	13
Primary food shopper for the store	83
Expresses desire to stock more fruits and vegetables	46
Expresses desire to stock other healthier foods	33
Number of employees	2.7±1.8
Store characteristics	
Number of years in business	9.5±7.7
WIC-approved	46
Accepts SNAP	92
Sells alcohol	13
Sells tobacco products	100
Need to be buzzed in	30
Checkout counter enclosed in Plexiglass	88
Behind-the-glass	25
Average # of different customers per day	165±145
Number of functional refrigerators (exclude beverage coolers)	1.3±0.8
Number of functional freezers	2.9±0.8
Received promotions* from food/beverage suppliers in the past 6 months	13
Frequency of food/beverage deliveries in the past 30 days	16.1±10.9

*free display, discount, or product samples

Employee characteristics

Baseline descriptive analysis found that over half (54%) of enrolled stores do not have non-family paid employees and that 92% of storeowners have at least one other family member working in their store, with an average of 2 (±1) family employees.

Food Sales & Customers

When asked which foods and beverage categories were top sellers, chips and soda were mentioned by 67% and 75% of storeowners, respectively. Secondarily mentioned were candy, juice, and water. Bottled water was mentioned by 88% of storeowners as having the highest profit margins out of other products in the store; deli meats were also reported by a third of storeowners. Water, soda, and chips were mentioned most often as having the highest gross profits for the store. Of 165 average daily customers, 80% were considered 'regular' (visited the store more than once weekly).

Wholesaler usage

All but one of the participating storeowners used the wholesaler $\geq$ 5 times in the previous month. Storeowners used the wholesaler (either location) on average 20 (±10) times per month and a median of 20 times per month. Storeowners also used two other local cash& carry stores on average 6 (±8) times per month and a median of 4 times a month. Sam's Club and Walmart were used by storeowners on average 10 (±10) times per month and a median of 5 times per month. Other sources used were dollar stores, local supermarkets and farmer's markets, but not as frequently.

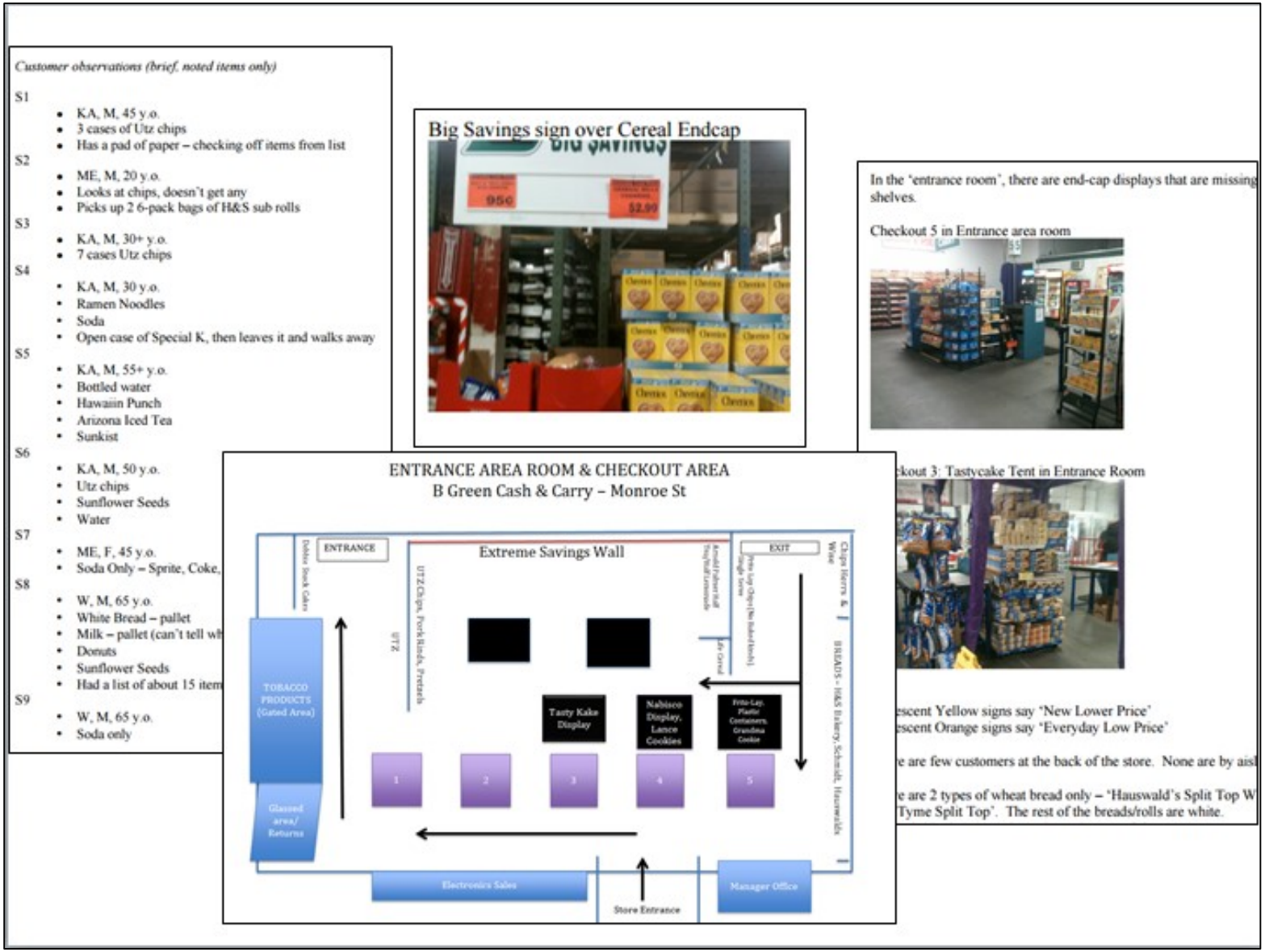
4.3. WHOLESALE-LEVEL FORMATIVE WORK

In Store Observations

A total of ten observations at the wholesaler were conducted from January-April 2012 to gain an understanding of the general store layout, availability and placement of food items, food prices, highly trafficked areas, existing food promotions and displays,

and customer shopping behaviors and selections. Five of the observations were conducted in the west Baltimore store, three at the east side store, and two others were conducted with storeowners during their shopping trips. Photos were taken during observations and basic maps were drawn of the store layout to identify possible locations for promoted foods (i.e., highly trafficked areas, end caps) (**Figure 4.1**). Study staff also recorded customer purchases.

Figure 4.1. Wholesaler observations



Customer observations (brief, noted items only)

S1
- KA, M, 45 y.o.
- 3 cases of Utz chips
- Has a pad of paper – checking off items from list

S2
- ME, M, 20 y.o.
- Looks at chips, doesn't get any
- Picks up 2 6-pack bags of H&S sub rolls

S3
- KA, M, 30+ y.o.
- 7 cases Utz chips

S4
- KA, M, 30 y.o.
- Ramen Noodles
- Soda
- Open case of Special K, then leaves it and walks away

S5
- KA, M, 55+ y.o.
- Bottled water
- Hawaiin Punch
- Arizona Iced Tea
- Sunkist

S6
- KA, M, 50 y.o.
- Utz chips
- Sunflower Seeds
- Water

S7
- ME, F, 45 y.o.
- Soda Only – Sprite, Coke,

S8
- W, M, 65 y.o.
- White Bread – pallet
- Milk – pallet (can't tell wh
- Donuts
- Sunflower Seeds
- Had a list of about 15 item

S9
- W, M, 65 y.o.
- Soda only

Big Savings sign over Cereal Endcap

In the 'entrance room', there are end-cap displays that are missing shelves.

Checkout 5 in Entrance area room

ENTRANCE AREA ROOM & CHECKOUT AREA
B Green Cash & Carry – Monroe St

kout 3: Tastycake Tent in Entrance Room

escent Yellow signs say 'New Lower Price'
escent Orange signs say 'Everyday Low Price'

e are few customers at the back of the store. None are by aisl

e are 2 types of wheat bread only – 'Hauswald's Split Top W Tyme Split Top'. The rest of the breads/rolls are white.

Pilot Wholesaler IDI

In-depth interviews with wholesalers were planned in order to understand barriers and facilitators to stocking and marketing healthy food, and pricing decisions. A 20-question in-depth interview guide was developed and piloted with the store manager in January 2012 **(Table 4.3)**.

Table 4.3. Example of wholesaler IDI questions

Stocking decisions	
	• Can you tell me about the foods that you would like to stock but currently do not?
	• Please explain how and when you decide what (produce, breads/cereals, etc.) to stock in your store.
Promotions	
	• Which manufacturers/suppliers provide you with promotional funding?
	• Could you describe how trade promotions play a role in your business?
	• How could your suppliers make stocking/selling healthier foods easier for you?

After the reviewing the transcripts, I decided to replace one-on-one in-depth interviews with more structured group business meetings with wholesaler executives, including the CEO, tech support, and food buyers. There were several reasons for this decision. First, I discovered that each of the wholesale staff had a specialized job, so that they were not able to answer general questions on stocking, pricing, or sales decisions. Second, the time burden was too great for individual wholesale staff to be interviewed. Third, priority was to make decisions on stocking and pricing of promoted products and this was most efficiently done through structured meetings. In short, in-depth interviews were not useful or appropriate for the needs of the project. However, future qualitative research with wholesale staff could be helpful in understanding how best to incentivize their suppliers to take part in healthier pricing initiatives and to understand how trade promotions are utilized at the wholesale-level. Future

exploratory research may want to focus on the food buyers of food wholesalers, as they are the individuals who handle day-to-day negotiation with suppliers.

CHAPTER 5. B'MORE HEALTHY: RETAIL REWARDS - DESIGN OF A MULTI-LEVEL COMMUNICATIONS AND PRICING INTERVENTION TO IMPROVE THE FOOD ENVIRONMENT IN BALTIMORE CITY (PAPER 1)

Citation:
Budd, N., Cuccia, A., Jeffries, J. K., Prasad, D., Frick, K. D., Powell, L., Katz, F., Gittelsohn, J. (2015). B'More healthy: retail rewards - design of a multi-level communications and pricing intervention to improve the food environment in Baltimore City. *BMC Public Health*, *15*(1), 1–13.

5.1. ABSTRACT

Background: Low-income black residents of Baltimore City have disproportionately higher rates of obesity and chronic disease than other Maryland residents. Increasing the availability and affordability of healthy food are key strategies to improve the food environment and can lead to healthier diets. This paper describes B'More Healthy: Retail Rewards (BHRR), an intervention that tests the effectiveness of performance-based pricing discounts and health communications, separately and combined, on healthy food purchasing and consumption among low-income small store customers.

Methods/Design: BHRR is 2x2 factorial design randomized controlled trial. Fifteen regular customers recruited from each of 24 participating corner stores in Baltimore City were enrolled. Food stores were randomized to 1) pricing intervention, 2) communications intervention, 3) combined intervention, or 4) control. Pricing stores were given a 10-30% price discount on selected healthier food items, such as fresh fruits, frozen vegetables, and baked chips, at the point of purchase from two food wholesale stores during the 6-month trial. Storeowners agreed to pass on the discount

to the consumer to increase demand for healthy food. Communications stores received visual and interactive materials to promote healthy items, including signage, taste tests, and refrigerators. Primary outcome measures include consumer food purchasing and associated psychosocial variables. Secondary outcome measures include consumer food consumption, store sales, and associated storeowner psychosocial factors. Process evaluation was monitored throughout the trial at wholesaler, small store, and consumer levels.

Discussion: This is the first study to test the impact of performance-based pricing and communications incentives in small food stores, an innovative strategy to encourage local wholesalers and storeowners to share responsibility in creating a healthier food supply by stocking, promoting, and reducing costs of healthier foods in their stores. Local food wholesalers were involved in a top-down, participatory approach to develop and implement an effective and sustainable program. This study will provide evidence on the effectiveness of price incentives and health communications, separately and combined, among a low-income urban U.S. population.

Trial Registration: ClinicalTrials.gov NCT02279849 (2/18/2014)

Key words (3-10 words): obesity**,** RCT, food stores, food access, pricing, intervention, low-income, urban

5.2 BACKGROUND

Obesity is arguably the leading public health problem facing Americans today, contributing to more annual chronic disease-related deaths, disability, and financial burden than either alcohol or tobacco use (Sturm, 2002). Minority groups have a higher prevalence of obesity than whites, and non-Hispanic blacks have the highest prevalence among all ethnic groups in the U.S. (Lovasi, et al., 2009; Wang & Beydoun, 2007). Analysis of NHANES data found that low-income groups were also disproportionately affected over a span of 30 years (Sing, Siahpush, Hiatt & Timsina, 2011; Wang & Beydoun, 2007; Zhang & Wang, 2004).

In Baltimore City, Maryland, racial and economic health disparities persist. Within the city, the poorest (< $15,000 annually) groups are 2.4 times more likely to be obese compared to those with the highest incomes (>$ 75,000 annually) (CHS 2009), while low income neighborhoods have the lowest availability of healthy foods (CHS, 2009; Franco, et al., 2008). Twice as many black residents live below poverty level (26.7% vs 14.5%), and have almost twice the obesity rate (43.5% vs. 23.3%) as whites, and have the highest rates of death from diabetes, the comorbidity most strongly influenced by body weight, compared to all other ethnic groups in the city (Baltimore City Health Disparities Report Card, 2013; Fact Sheet, 2008; Maryland Vital Statistics Annual Report, 2013). In the United States, poverty and obesity are positively correlated (Drewnowski, 2009), and though public health programs have limited capacity to affect poverty status, intervening on possible mediators, such as food access, can help to eliminate health disparity and inequity gaps (Drewnowski & Specter, 2004).

In the past decade, improving food environments and increasing access to healthy foods has been identified as a key strategy for obesity prevention and reduction efforts (Keener, Goodman, Lowry, Zaro & Kettel Khan, 2009).

Low-income, predominantly black neighborhoods of Baltimore City are replete with small convenience-type food stores and nearly void of supermarkets (Baltimore City, MD food systems profile, 2014). Small stores are a primary food source among inner city residents (D'Angelo, Suratkar, Song, Stauffer & Gittelsohn, 2011), which are often lacking healthier foods, including fresh fruits and vegetables, low-fat milk, and whole wheat bread (Franco, et al., 2008). Sharma et al (2009) reported high consumption of high fat foods and sugar-sweetened beverages, and extremely low consumption of fruits and vegetables, among low-income black residents (Sharma, et al., 2009). Small food store interventions have had positive impacts on store availability, sales, and consumption of healthier foods and beverages (Gittelsohn, et al., 2012). Most small store trials have used education- and communication-based strategies, such as signage and shelf labels, and/or structural changes, such as shelving or refrigeration, to improve food access (Gittelsohn, et al., 2012). However, solely increasing the availability of healthy foods will have limited impact on purchasing and consumption if the foods within these environments are not affordable. To our knowledge, no small food store studies have tested the feasibility or impact of pricing discounts to increase healthy food purchasing and consumption (Gittelsohn, et al., 2012).

The price of food is one of the most important determinants of consumer purchasing decisions (Glanz, et al., 1998). A systematic review of field experiments by

An (2013) demonstrated that direct-to-consumer price discounts were consistently effective in increasing the purchase and consumption of healthier promoted foods (An, 2013. However, most of the studies occurred in larger food venues, such as supermarkets, restaurants, and cafeterias, and only 4 out of 20 studies targeted low-income populations (An, 2013). Furthermore, only three published factorial design trials, designed to show interactions between interventions, have tested health education/communications strategies and pricing reductions, separately and combined, on consumer purchase and consumption of healthy foods in a retail food store-setting (Ball, et al., 2011; Ni Mhurchu, et al., 2010; Waterlander, et al., 2013). A 2x2 randomized controlled trial ('SHOP') in 8 New Zealand supermarkets found that nutrition education had no effect on food purchases, while a 12.5% discount in price was associated with 11% increase ($p<0.001$) in healthier food purchases in both pricing and combined groups (Ni Mhurchu, et al., 2010). While these results are promising, this trial did not target low-income consumers, who often have less access to healthier foods and are more sensitive to price changes than their higher income counterparts (Powell & Chaloupka, 2009; Powell, Chriqui, Khan, Wada & Chaloupka, 2013). A 2x2 randomized controlled trial in Dutch supermarkets found no effect of nutrition education alone on fruit and vegetable purchases, but a significant increase in fruit and vegetable purchases with a 50% discount, and the greatest increases when pricing was combined with nutrition education (Waterlander, et al., 2013). This trial illustrates the impact of subsidies on purchasing behavior; however, the likelihood of translating such a high

subsidy into policy may not be politically feasible, whereas small price changes with adjunctive strategies may be possible (Epstein, et al., 2012).

There have been no factorial design pricing and communications trials in small food stores, and none in any type of food store domestically. The strategies, results, and implications of prior food store trials in Australia, New Zealand, and the Netherlands are unlikely to be generalizable to those implemented and observed in the United States. Moreover, all three trials occurred in supermarkets, which have greater economies of scale compared to the small retail stores ubiquitous in poor, urban neighborhoods. Small retail food stores are a predominant food source in Baltimore City and small food store shoppers purchase unhealthier foods compared to those that use other food sources (D'Angelo, et al., 2011). However, small independent food stores operate within a different context than do larger food store chains (e.g., limited purchasing power, less infrastructure, independently owned), and we do not know what combination or level of price reductions and communications will spur healthier food purchases and consumption among a lower income and more price sensitive population.

The three published factorial design pricing trials applied direct-to-consumer discounts through vouchers in the mail (Waterlander, et al., 2013), or electronically at checkout (Ball, et al., 2011; Ni Mhurchu, et al., 2010). Pricing interventions that subsidize healthier foods for consumers may be effective but also may be costly, and therefore harder to sustain in the long term. For example, evaluation of the Healthy Incentives Pilot, a government funded program that provided financial incentives to

SNAP participants for the purchase of healthier food, found significant increases in fruit and vegetable consumption, but also estimated that implementing the program nationwide for five years would cost $90 million, not including incentive costs for retailers (Evaluation of the Healthy Incentives Pilot (HIP) Final Report, 2014). An alternative way to reduce consumer costs of healthier foods is through performance allowances (also known as trade promotions or promotion allowances), a standard food industry marketing practice. With performance allowances, manufacturers pay downstream distributors and/or retailers for a certain performance, such as slotting allowances to acquire prime shelf space or advertising allowances paid from the marketer to the retailer for advertising a certain product. Trade promotions, including performance allowances, are used to increase sales and stocking of certain foods during specific periods of time (Poddar & Donthu, 2011). In light of increasing public pressure to offset the negative health consequences of their products, the food industry's self-regulatory efforts could include performance allowances to increase sales and consumption of healthier and lower calorie foods. For example, a manufacturer could provide slotting or advertising allowances on their lower calorie or healthier snacks, which theoretically would help to increase both their supply and demand. This method not only has the potential to create long-term availability of healthier foods at retailers, but supports the notion that food companies should be required to reduce the public health problems (i.e., obesity) for which some public health experts hold them responsible (Sugarman, 2009). To our knowledge, no public health intervention trial has

employed performance or trade allowances as a pricing strategy to increase healthy food purchases and consumption.

This manuscript describes the study design of a multilevel communications and pricing intervention called B'More Healthy: Retail Rewards (BHRR). In this study, we test the impact of performance-based allowances on the purchase, stock, display, and sales of healthier foods in wholesale and small retail food stores in low-income areas of Baltimore City. We focus on small food stores and a low-income population, where sensitivity to price changes are greater and where food access research is needed most (Powell & Chaloupka, 2009; Powell, Chriqui, Khan, Wada & Chaloupka, 2013). Lastly, we introduce an innovative approach that incorporates established and effective food industry practices within a public health framework. Descriptions will follow the Consolidated Standards of Reporting Trials (CONSORT) reporting guidelines.

5.2.1. Study Aims

The overarching goal of the BHRR trial is to develop, implement, and evaluate a multi-level communications and pricing intervention to improve the food environment in low-income areas of Baltimore City, Maryland. BHRR has three primary aims: (1) to conduct formative research with representatives of multiple levels of the Baltimore food environment (i.e., local wholesalers, retail food store owners, and consumers) in order to select key foods for promotion, and determine appropriate communication strategies and price reductions, (2) to implement a multi-level program with two local wholesale stores, and twenty-four small food stores and their customers, and assess program implementation through detailed process evaluation, and (3) to assess the impact of

separate and combined pricing and communication strategies on consumer food behaviors, mediating psychosocial variables (i.e. self-efficacy) and weight outcomes; small store healthy food stocking, healthy food sales, and mediating storeowner psychosocial factors; and wholesaler sales and stocking of selected healthy foods.

5.3. METHODS

5.3.1. Study Design

BHRR is a 2x2 factorial RCT **(Figure 5.1.).** Twenty-four small corner stores located in low-income census tracts of Baltimore City were randomized to one of four treatment groups: communications only (n=6), pricing only (n=6), combined communications and pricing (n=6), or control (n=6). Performance allowances in the form of healthy food discounts (10-30% off wholesale price) were directed from the wholesaler to the pricing only and combined intervention stores (12 stores total) at checkout for 6 months. In return for the discounts, storeowners were asked to stock selected healthier foods, and display communications materials and/or pass discounts to their consumers. The communications only and combined intervention stores (12 stores total) received in-store health communications, including taste tests, posters, and small refrigerators or freezers, to help stock and promote the sale of selected healthier foods. All customers of the participating corner stores were exposed to the 6-month intervention directed to that store. This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

5.3.2. Study Hypotheses

The study tests the consumer-level hypotheses that, by the end of the 6-month intervention, customers of the 18 intervention stores (pricing only, communications only, and combined) will have, 1) greater increases in frequency of purchasing and consumption of the promoted foods than those at control stores, with the greatest increases among those consumers at combined intervention stores, and 2) greater increases in psychosocial factor scores relating to healthy food choices than those at control stores, with the greatest increases in the combined intervention stores. The study tests the store-level hypotheses that, by the end of the 6-month intervention, the 18 intervention storeowners will have 3) greater increases in sales and stocking of promoted foods compared to control stores, with the greatest increases in the combined intervention stores, and 4) greater increases in store owner psychosocial factor scores related to stocking and sales of promoted foods compared to control stores, with the greatest increases in the combined intervention stores.

5.3.3. Theoretical Framework

The theoretical framework that guides the BHRR intervention and its evaluation is based on Social Cognitive Theory (SCT) (Bandura, 1986), the Social Ecological Model (SEM) (Bronfenbrenner, 1977; Stokols, 1996), and economics' law of demand. SCT and SEM stress that individual behavior change relies on the dynamic interplay between the individual and his or her environment, and in order to create sustained change, public health interventions must target multiple levels. They have been extensively employed for diet-related and store-based interventions (Escaron, et al., 2013; Gittelsohn, et al.,

2012). Small refrigerators or freezers were supplied in order to create supportive environments to stock and promote healthier foods in small stores. Individual behavior change using health communications was sought through intervening on possible mediators to stocking and purchasing healthier foods such as self-efficacy, intentions, and outcome expectations. Baseline analyses on the association between psychosocial factors and food acquisition behaviors have found that higher self-efficacy and intentions scores are associated with greater frequency of healthy food purchases and lower frequency of unhealthy food purchases (unpublished data). Thus, targeting specific psychosocial factors in health interventions may enhance an individual's ability to make healthier food choices.

In economics, the law of demand states that, all else being equal, there is an inverse relationship between quantity demanded and its price. We expect that a reduction in price of healthier foods will elicit an increase in consumer purchase and consumption of promoted foods. Monetary performance allowances were provided as incentives for wholesalers and retailers to stock and discount healthier foods and thereby increase supply and demand.

5.3.4. Setting

Baltimore City's overall population is approximately 622,000; where almost one quarter live below poverty level, and almost two-thirds are African American (State and County Quick Facts, 2013). There are approximately 659 small retail food stores[4] within

[4] Small food stores are defined as follows: "Superettes," sometimes called "mom & pop" stores or corner stores, carry a basic, narrow selection of food items. They tend to have few if any service departments, and have annual food sales of less than $2 million. "Corner Stores" are non-chain

city limits, many of which are located in food deserts[5] (Baltimore City, MD food systems profile, 2014). A 2007 community food assessment found that 46% of monthly shopping trips among residents of Southwest Baltimore were to small food stores, where average individual expenditures were $114 per month (Palmer, et al., 2009). The target group in BHRR is low-income African American adult customers of small retail stores located in the city.

Food wholesalers sell larger quantity goods to industrial, institutional, and commercial users, but generally do not sell in large amounts to individual consumers. Two competing businesses operate three wholesale stores or warehouses located within Baltimore City limits, where small food retailers can pick up items. Two stores are located in the southwest region of the city, and one store is located in the northeast section of the city. BHRR works with one wholesaler, which operates two warehouses that serve retail stores in the Baltimore market. One of the warehouses also serves as a distribution site for a direct delivery service. The warehouses carry over 30,000 items, including National Brands (Deer Park, Pepsi, Frito-Lay), private labels (Richfood, Everyday Essentials), and regional items (Esskay, Rutters, Utz, Everfresh). Small

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Superettes in Baltimore City that sell a limited selection of non-perishable food items. Typically operated by the owner or the owners' family members or friends, "Behind Glass Corner Stores" are characterized by having barriers of Plexiglas walls separating the consumer on one side from the retail items and owner/workers on the other side.
Source: MD food systems profile. Maryland Food Systems Map.2014. http://mdfoodsystemmap.org/

[5] Food desert is defined as an area where the distance to a supermarket is more than one quarter of a mile; the median household income is at or below 185% of the Federal Poverty Level; over 40% of households have no vehicle available; and the average Healthy Food Availability Index score for supermarkets, convenience and corner stores is low (measured using the Nutrition Environment Measurement Survey)
Source: MD food systems profile. Maryland Food Systems Map.2014. http://mdfoodsystemmap.org/

storeowners represent 90% of its clientele, while the other 10% are foodservice customers.

5.3.5. Eligibility and Recruitment

Wholesaler recruitment

Both wholesale businesses in Baltimore City were invited to participate in the study. One wholesale business (with store location) declined participation. All of the 24 participating retailers regularly shop (1x/week) in at least one of the participating wholesaler's store locations. In addition, 16 out of the 24 participating storeowners use the other wholesale business regularly, 19 use a warehouse club located outside of city limits (and not considered for the study), and 13 use a discount department store. The participating wholesaler has agreed to provide research staff with sales data pertinent to the study.

Store recruitment

The Johns Hopkins' Center for a Livable Future provided study staff with GIS maps of small food stores that are located in low-income census tracts where greater than 75% of residents are African American. Study staff selected stores on the maps that met the following inclusion criteria: 1) in 2009, had average annual purchases of $5,000-20,000 from one or more participating food wholesalers; 2) not part of past store-based intervention trials in Baltimore (Gittelsohn, Suratkar, et al., 2010; Song, et al., 2009); and 3) were at least ¼ mile apart from each other. Recruitment of storeowners involved explanation of the purpose of the study, and distribution of recruitment materials explaining frequently asked questions and answers about the program. Korean-speaking

research staff and translated recruitment materials were used in the recruitment of Korean storeowners. Staff approached 82 active stores for participation in the study; 34 storeowners refused to participate (e.g., citing a lack of time or not providing a reason), 16 asked staff to return when the owner was there, and 32 initially agreed to participate and out of those, 8 dropped out of the study prior to baseline data collection. Twenty-four storeowners completed surveys at baseline, 23 storeowners completed post-intervention surveys, and 22 storeowners completed the 6-month intervention in its entirety. Written informed consent was obtained immediately preceding any interviews and surveys.

Consumer recruitment

A convenience sample of the first fifteen eligible customers/consumers that expressed interest in participating in the research study were recruited between May and September 2012 (total n=360 consumers). Participants were eligible for the study if they: (1) were African American adults aged 21 or older, (2) lived within 0.25 miles of the store where they were recruited, (3) shopped in the store at least once a week, and (4) were the main food shopper for their household. All participants were interviewed outside of the stores where they were recruited, were explained the purpose of the study and signed a written informed consent form prior to interviews.

Both store owner and consumer respondents were compensated with $20 gift cards upon completion of each interview, which lasted approximately 1 hour.

5.3.6. Power Calculation

Data used to calculate sample size were taken from a previous store-intervention study of African American adults in low-income inner city areas of Baltimore (Song, et al., 2009). To account for clustering, we calculated sample size based on the intra-class correlation (ICC) formula (Murray, Phillips, Birnbaum & Lytle, 2001) using a previous study's psychosocial and food purchasing data. With a final, post-intervention sample of 12 consumers per store (n=288 total) and 6 stores per groups, we will be able to detect an increase of 2 points in the food knowledge score, which implies that the respondent can correctly answer 2 additional questions related to food knowledge; an increase of 5 points for the self-efficacy score, which implies that the respondents feels confident to perform at least 1.3 additional healthful behaviors (i.e., choosing water instead of a sugar-sweetened beverage); and an increase in 3 points on healthy eating intentions, which implies that the respondent intends to perform at least 1 additional healthful behavior (i.e., purchasing 1% milk instead of whole milk). Using a conservative estimate of ICC for healthy and unhealthy food getting frequencies, we will be able to detect approximately 20 points increase in the healthy food getting frequency and a 20 point decrease in the unhealthy food getting frequency.

5.3.7. Randomization and blinding

To ensure comparison of treatment groups with similar characteristics, stores were stratified by WIC status and daily sales volume. Daily sales volume was calculated from the baseline unit sales of promoted foods in the past 30 days. Greater than or equal to 20 unit sales of promoted items per day was defined as large volume, while less

than 20 unit sales per day was defined as low volume. Sales volume was used as a proxy for daily sales revenue, since storeowners were reluctant to share exact monetary estimates with research staff. Similarly, WIC status was used as a proxy for healthy food stocking, since stores carrying WIC must have a minimum required stock of certain healthy foods at all times. Thus, randomization was stratified by: high-volume stores with WIC; high-volume stores without WIC; low-volume stores with WIC; low-volume stores without WIC.

5.3.8. Intervention Design and Implementation

Extensive formative research, including in-depth interviews, observations, and focus groups with small storeowners and consumers, was carried out from January to October 2012 and is summarized in Table 1. Qualitative data was transcribed, entered and coded using the Atlas-Ti textual data analysis software program (version 7.0, Scientific Software Development GmbH, Berlin, 2012). In addition, multiple structured business meetings with wholesale staff helped to formulate appropriate pricing strategies and protocol for passing on discounts to customers.

Selection of foods for promotion

Promoted items included a combination of fruits, vegetables, low-fat snacks, lower calorie beverages, and whole grain products. The items were intended to serve as healthy alternatives for items most frequently purchased from corner stores, including nutrient-poor, calorie-dense snack foods and drinks (i.e., chips, cookies, sodas) and staple food items (i.e., bread, cereal, milk, cheese). Promoted foods fell into one or

more categories as defined by the U.S. Food and Drug Administration (FDA) (Guidance for Industry, 2013):

- Low-fat – 3 g or less per Reference Amount Customarily Consumed (RACC) or 100 g and not more than 30% of calories from fat
- Reduced fat – at least 25% less fat per RACC or 100 g
- Reduced sugar – at least 25% less sugar per RACC or 100 g
- Low-calorie – 40 calories or less per RACC or 120 kcal or less per 100 g
- Reduced calorie – at least 25% fewer calories per RACC or 100 g
- High-fiber – contains 20% or more of the Daily Value for fiber per RACC.

The intervention consisted of three phases, each of which expanded upon the preceding phase, so that by the final phase, all foods and beverages were promoted simultaneously. Phase 1, from February to April 2013, promoted lower calorie/fat beverages including 1% milk, bottled water, and selected reduced calorie colas. Phase 2, from April to June 2013, promoted nutrient-dense staple foods including 100% whole wheat bread, canned tuna in water, and frozen vegetables, in addition to Phase 1 drinks. Phase 3, from June to August 2013, promoted lower fat snack foods; including fresh fruit, low fat granola bars, and baked potato chips, in addition to Phase 1 & 2 foods.

Pricing intervention

A previous Baltimore-based corner-store study described the importance of addressing both financial risk of stocking new products and the psychosocial burden that many storeowners feel in response to the pressure of stocking promoted foods (Song, et al., 2011). BHRR was designed to reduce this burden by allowing storeowners

to purchase healthier promoted items at reduced costs from the participating wholesaler. The amount of discount applied to each promoted item was determined through formative research with wholesale staff (as the minimum discount required to result in increased sales), and with storeowners (as the minimum discount required by retailers to agree to stock the foods and pass through savings to customers (known as channel or retail pass-through). Discounts ranged from 10-30% and were similar to amounts applied in previous studies (Ball, et al., 2011; Michels, et al., 2008; Waterlander, et al., 2013). Discounts on promoted items were automatically applied at wholesale registers to stores receiving the pricing intervention (n=12) from February to August 2013. Grant funding was used to reimburse the wholesalers. In exchange for discounts, the pricing group storeowners (Groups 1 & 3) agreed to the terms of the performance allowance: to stock the promoted foods, to provide retail pass-through to customers, and to display communications materials (combined group only). Storeowner compliance to the performance allowance strategy was monitored throughout the program through process evaluation. Item discounts were introduced at each phase and sustained for the duration of the program so that during the first month only beverages were discounted, and by the last month, all promoted foods were discounted simultaneously.

Communications intervention

Wholesaler-level

The communications portion at the wholesaler-level was minimal due to the necessity to prevent cross-contamination of store owners in the pricing and control

groups (Groups 1 & 4). 'Hidden' communications for Groups 2 & 3 (Communications & Combined groups) included 1) marking promoted foods and beverages with a 2" circumference BHRR logo sticker at both Cash & Carry locations, and 2) providing intervention store owners with a pamphlet that contained exact aisle locations for the items. Wholesale staff members were instructed to keep the promoted items stocked at all times during the intervention period.

Store-level

A graphic artist and research staff developed store-level communications materials based on formative research findings. Preferred words and phrases cited by corner store customers included 'energy', 'living better', 'clean and fresh', 'natural', 'fresh foods at a reasonable price', and '100%' (as in whole grains). Other suggestions for point of purchase materials were to provide quick descriptive words that explained why a particular food was healthy (i.e., fiber-rich, heart-healthy), as well as quick, catchy sayings (i.e., 'refresh!', 'power up!') to appeal to consumers. Posters and window signs were requested to be 'simple' and 'easy to read' since the amount of time customers spent in the store was brief. The colors purple and orange were used in all communications materials and were selected to match Baltimore City professional football and baseball teams. Materials were piloted in the community and revised before intervention implementation to ensure acceptability and resonance.

For the communications stores (Groups 2 & 3), each phase included 4-5 visits to stores for interactive sessions that included giveaways, educational handouts or recipe cards, and taste tests or educational activities. Promotional materials were tailored to

each phase's theme. For example, in-store promotions for Phase 1: Beverages, included blind taste testing of lower calorie beverages, an educational display showing the amount of sugar in commonly consumed drinks, and free drink tumblers with the project logo. Posters displayed the benefits of switching to water or a low-calorie drink, and shelf labels and talkers highlighted promoted items on the shelves. The communications stores also received a small refrigerator or freezer to store fresh or frozen fruits and vegetables and other healthy foods as an additional incentive.

Interventionist Training

A BHRR manual of procedures was developed and used to train interventionists and to standardize practice across field sites. A 2-day interventionists' training, led by the study coordinator, included nutrition education sessions, demonstrations and role-play, prior to intervention implementation. Weekly staff meetings served to address issues associated with program implementation.

Data Collector Training

Before beginning the study, data collectors completed a computer-based course in the protection of human research subjects (CITI Program, University of Miami). Each data collector also participated in a 2-day, in-person, data collector training program led by the Principal Investigator, which reviewed: 1) human subjects ethics principles and procedures, 2) recruitment, sampling and consenting procedures, and 3) instruments and protocol for delivery. Data collectors were trained using a combination of lectures, role-play, and supervised practice interviews.

5.3.9. Outcomes and Measures

Outcomes were assessed at a minimum of two time points. Baseline interviews were conducted with small storeowners and consumers from April to December 2012. Post-intervention interviews were conducted from November 2013 to March 2014. All interviews were conducted in a quiet setting in or near corner stores, in participants' homes, or at the Johns Hopkins Bloomberg School of Public Health. Interviews with storeowners whose primary language was Korean were conducted by Korean-speaking research staff. English versions of forms were used for all data collection. A summary of study measures is shown in **Table 5.2**.

Primary outcomes

The primary outcomes of interest are the average change in consumer purchase of promoted foods and beverages, and related consumer psychosocial variables across treatment groups from baseline and post-intervention. The Adult Impact Questionnaire (AIQ) was used in past Baltimore Healthy Stores trials and was modified for this study (Gittelsohn, Suratkar, et al., 2010; Kharmats, et al., 2014; Suratkar, et al., 2010). Included in the 174-question AIQ is a section that assessed the frequency of food purchasing or 'food getting' (food obtained without purchasing) for 37 foods or food groups in the past 30 days, including promoted foods and unhealthier counterparts (e.g., baked chips vs. regular chips). The AIQ also contains sections that addressed individuals' psychosocial factors, including self-efficacy, intentions, and knowledge to perform healthy eating behaviors. The self-efficacy section contained 10 questions that captured the respondents' self-confidence in making healthy food choices. For example,

respondents choose out of four responses ranging from “very easy” to “would be impossible” to questions such as, “How easy or difficult would it be for you to eat fresh or frozen vegetables every day?” The 10-question intentions section addressed respondents’ intentions to purchase, consume, and prepare foods promoted by the intervention using a forced-choice format (i.e., “The next time you buy a sweet snack, which will you choose, Donut, Granola Bar, or Tastykake?”), and the 10-question knowledge section tested the ability to answer nutrition-related questions, such as interpreting food labels.

Secondary outcomes

Consumer dietary intake and consumption of promoted foods

Promoted food consumption was assessed using a previously-fielded brief quantitative food frequency questionnaire (QFFQ). Participants were asked to report the frequency of consumption of 22 foods/food groups over a 30-day period, choosing from eight categories ranging from “never” to “two or more times per day”. In addition to the QFFQ, a single quantitative 24 hour dietary recall was collected using a 5-step multiple pass methodology (Kharmats, et al., 2014). The dietary recall and QFFQ were collected on both weekdays and weekend days. The instrument was modified to include consumer food sources (i.e., supermarket, farmer’s market, corner store). Evaluation of consumer exposure to specific food sources will allow staff to track impact of local food policy initiatives (i.e., the proportion of calories consumed from urban corner stores). Dietary data will be analyzed using Nutrition Data System for Research (NDSR) software (version 11: Nutrition Coordinating Center, University of Minnesota).

Storeowner psychosocial variables to stock/sell promoted foods

Changes in psychosocial constructs toward the stocking and sales of promoted food items were assessed with the owners of participating corner stores. The Store Impact Questionnaire (SIQ) was adapted from an instrument previously used in former small store interventions (Gittelsohn, Song, et al., 2010; Song, et al., 2009) and was piloted before baseline data collection. The SIQ included sections on outcome expectations on sales of healthy foods and beverages, self-efficacy to stock, promote, and sell healthy foods and beverages, and intentions to sustain stocking and promotions on healthy items. Respondents were read a series of statements and asked to choose from one of five answers: Strongly Agree, Agree, Undecided, Disagree, or Strongly Disagree. Outcome expectations for promoted food sales was assessed with 16 questions (i.e., "Baked potato chips will sell well in my store"); outcome expectations on overall program impact was assessed with 18 questions (i.e., "If I receive a produce refrigerator for my store, fresh fruit/vegetable sales will increase"); 15 questions each were included to evaluate self-efficacy for stocking promoted foods (i.e., "I can stock 100% whole wheat bread in my store") and intentions to sustain stocking of promoted foods (i.e., "I will stock frozen vegetables in my store after the program is completed"); and 6 questions assessed storeowners' intentions to sustain pricing or communications promotions on the promoted foods after the program's completion (i.e., "I plan to display BHRR promotional materials even after the program is completed").

Sales of promoted foods

The SIQ captured promoted food sales by asking each participating store owner to estimate the number of units (i.e., cans, packages) of 15 key promoted foods sold in the store per day over the last 30 days. Additionally, a sales recall instrument, which has been used in earlier Baltimore-based studies, recorded store sales bi-monthly during the trial by asking each storeowner how many units of each promoted item were sold in the past 7 days (Song, et al., 2009). A total of 12-15 weekly sales recalls were collected per store.

Other outcomes

Consumer Body Mass Index

Anthropometric measurements were taken with adult consumer respondents wearing light, indoor clothing at baseline and post-intervention. Body weight was measured to the nearest 0.1 pound with Seca Model 880 portable electronic scale (Seca Corporation, Columbia, MD). Standing height to the nearest 1/8 (0.125) inch was measured with a Shorr Height Board (Shorr Productions, Olney, MD). Weight and height measurements were taken twice and averaged. If height measurements differed by $\geq$ 0.25 in or weight differed by $\geq$ 0.2 lb., a third measurement was taken and all 3 were averaged. These measures were used to calculate adult body mass index (BMI).

Household food security, food assistance, health beliefs, socio-demographics

The AIQ included the 18-item Household Food Security Survey (HFSS) module (Economic Research Service, USDA, 2008). The 18-item section included 10 questions that concern the experiences of adults and 8 concerning respondents' experiences of providing food to children in their households. A section with 13 questions assessed

participants' health beliefs and attitudes and body image (e.g., "Healthy foods are expensive" and "I am satisfied with my weight") using a 5-point Likert scale. Also included were questions regarding food assistance program participation over the past 12 months (e.g. SNAP, WIC), education level, income, employment, marital status, and housing.

Wholesaler sales of promoted foods

The participating wholesaler has agreed to provide promoted food sales records generated from wholesale databases. Reports will provide information on unit sales and revenue for each promoted food or beverage item overall and per participating store for each promoted food item from January to September 2013.

Process Evaluation

Intervention implementation at the consumer-level was monitored twice monthly. Data collectors evaluated interactive sessions at each of the communications stores (n=12) by reporting the number of consumers contacted through interactive sessions (reach), the number of different intervention components (i.e., giveaway, taste test, pamphlet, recipe card) delivered to each consumer at each interactive session (dose delivered), and how well each interactive session was delivered (fidelity) (Gittelsohn, Suratkar, et al., 2010; Steckler & Linnan, 2002).

Intervention implementation at the store-level was monitored using a store environmental assessment form, modeled after the Nutrition Environment Measurement Survey-Stores (NEMS-S) instrument (Glanz, Sallis, Saelens & Frank, 2007), to assess presence and placement of promoted food items and communications

materials, and to provide additional commentary on contextual factors (e.g. cleanliness of store, expired items). The form also assessed whether the price was marked and if BHRR shelf labels or talkers were present and correctly identified the item. A wholesaler process evaluation form was used to track presence and visibility of promoted food items and BHRR logos. Pricing discount implementation will be evaluated using wholesaler electronic sales records and a weekly sales recall for small stores (12-15 sales recalls per store). At post-intervention, a separate intervention exposure questionnaire measured dose received, defined as the proportion of respondents who successfully recall exposure to a variety of specific intervention components/materials, for storeowners and customers.

5.3.10. Analyses

Descriptive statistics will be used to compare the demographic characteristics of intervention and control participants at baseline using means or medians for continuous variables and proportions for categorical variables. A series of scales and scores will be developed to evaluate the impact of the intervention on food acquisition and psychosocial factors for consumers and storeowners (Song, et al., 2009; Suratkar, et al., 2010). All scales will be assessed for internal consistency and reliability using Cronbach's alpha.

Key outcome variables will be store- and consumer- level outcomes, with treatment condition as the primary exposure variable. An intent-to-treat approach will be used to test study hypotheses. Multiple regressions will be conducted to assess program impact on consumer food-getting and food consumption, consumer BMI and

food security, consumer and storeowner psychosocial variables, and small store purchasing and sales. All analyses will account for clustering (by store for individual-level outcomes and over time for store-level outcomes) using multiple regressions with clustered robust standard errors (e.g. Huber-White), generalized estimating equations (GEE), or multilevel modeling methods (Analyzing Correlated (Clustered) Data, n.d.). We will first test for interactions between pricing and communications intervention groups, and will remove the interaction term if effects are not found (Trochim, 2006). Statistical tests will be two-tailed with an alpha set at 0.05. Summary statistics will be used as appropriate for process evaluation data.

5.4. DISCUSSION

Utilization of food industry sales promotion techniques to improve healthy food purchase and consumption is a novel approach. To date, pricing research has centered on consumer promotions, either through deals offered by manufacturers directly to consumers, or by retailers to consumers (Poddar & Donthu, 2011). Policy-driven pricing initiatives to improve food behaviors have been in the form of consumer subsidies or taxes (e.g., WIC vouchers). In contrast, performance allowances are deals offered (i.e., discounts, rebates, coupons) to retailers with the expectation that retailers pass them through trade deals to consumers (Poddar & Donthu, 2011). Retailers may benefit from performance allowances on healthy foods by either, buying at discounted prices and selling at normal prices, or by increasing sales of the promoted item when savings are passed on (Poddar & Donthu, 2011). Both strategies increase the availability and potential sales of healthier foods in stores, whereas consumer price incentives may not

motivate retailers to stock those foods that are healthier for consumers. Consumer food preferences and norms are heavily influenced by food industry advertising and sales promotions. With sufficient incentives (i.e., tax breaks, regulatory action), food manufacturers can help to increase the demand for healthier products and behaviors that may help towards the reduction of obesity and its related co-morbidities.

Another distinguishing innovative characteristic of the study is that this is the first randomized controlled trial to involve food wholesalers in a food access intervention program. One previous study conducted phone interviews with produce wholesalers in New Orleans (O'Malley, et al., 2013), however, none to date have implemented a research study with food wholesalers. In addition, while a few other cities have partnered with distributors and wholesalers in addressing healthy food access ("Toward a sustainable model", 2013), this is the first program to do so in Baltimore. Given that wholesale stores are the main sources of food for small retail stores in the city, it is both intuitive and essential to involve these suppliers in healthy food access initiatives. An obvious approach to increasing healthy food supply in small corner stores is to ensure adequate stock of healthy foods at their wholesalers. However, simply stocking healthy foods does not guarantee that the foods will be bought, thus, more complex pricing and promotional strategies to increase demand are being tested in this trial.

The feasibility of using performance allowances and communications will be evaluated through process evaluation. A top-down price promotion may not reach the consumer level, and it is unknown whether simply stocking and promoting the product

is sufficient to impact consumer food behaviors or if additional consumer-level price reductions are needed to generate increased demand. Thus, in addition to the study's main outcome measures, this study will also shed light onto the mechanisms of trade promotions and analyze overall system-level effects (consumer-retailer-wholesaler) (e.g., Do price reductions need to reach the consumer to increase demand for healthier food in low-income urban settings?). Most research on trade promotions, including performance allowances, remains theoretical and overly simplified, using simulations and modeling to determine effects (Poddar & Donthu, 2011). Therefore, a key research question is whether retail pass-through is a feasible and effective approach to increase healthier food purchases and consumption in a small store setting.

Results will provide original evidence on the effectiveness of multi-level pricing and communications interventions to improve food access in low-income minority settings, and will provide insight for further studies seeking to work with food suppliers and trade promotions to improve the food environment. Such food access interventions, aimed at ultimately reducing the prevalence of obesity among low-income urban populations, may greatly decrease rates of chronic disease and health care costs nationally (Thow, Jan & Swinburn, 2010).

List of abbreviations

BHRR: B'More Healthy: Retail Rewards; AIQ: Adult Impact Questionnaire; PE: Process Evaluation; SIQ: Store Impact Questionnaire; QFFQ: Quantitative Food Frequency Questionnaire; WIC: Special supplemental nutrition program for women, infants, and children.

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Figure 5.1. BHRR Study Design

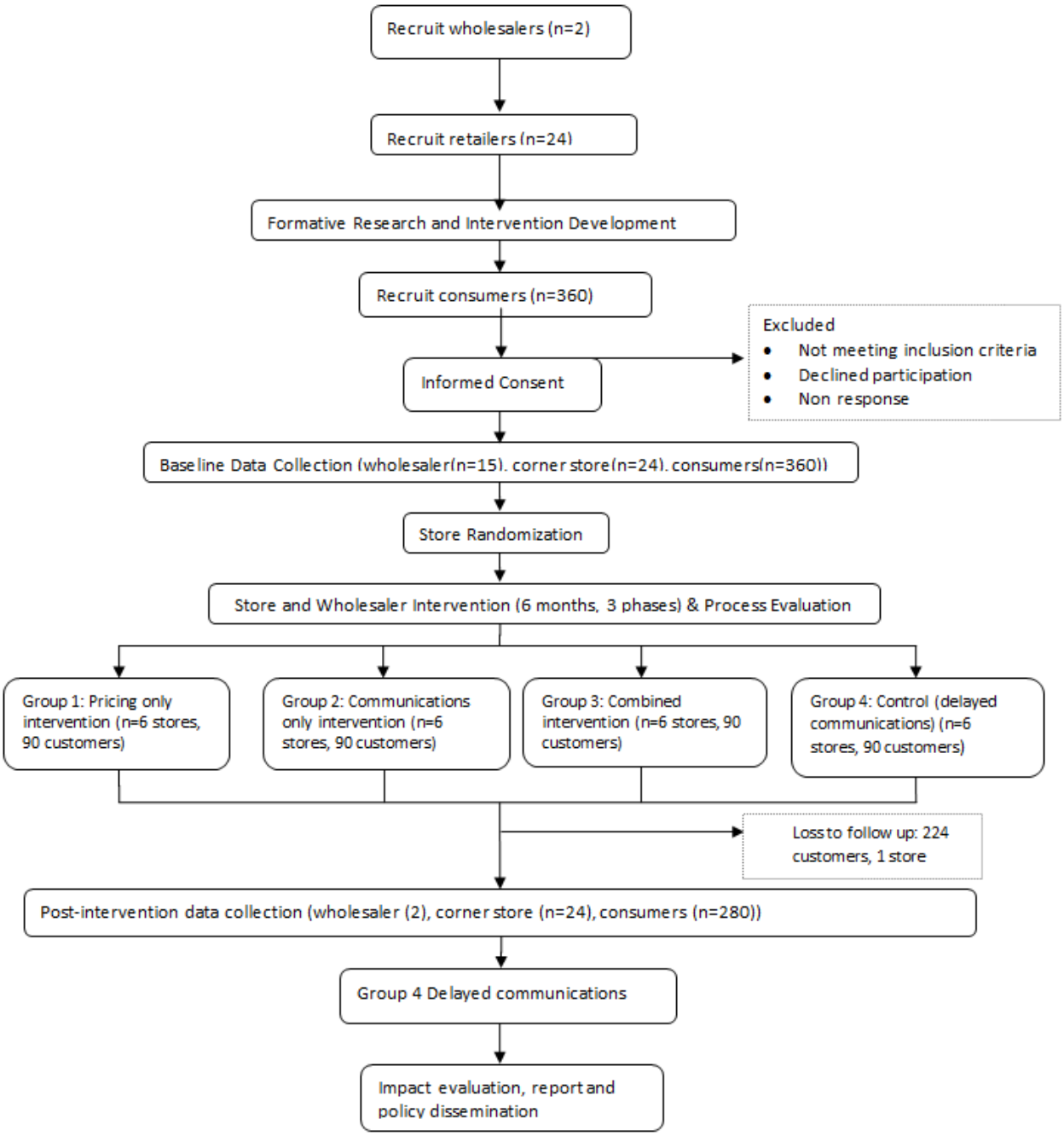

Table 5.1. Completed Formative Research with Wholesalers, Storeowners, and Consumers

Date	Level	Activity	Objectives
Jan – Mar 2012	Wholesaler	Direct Observation (n=12)	To examine retailers' purchasing patterns and food selections and to understand marketing factors influencing their choices at wholesale stores.
Feb - Mar 2012	Store owner	Direct Observation (n=17)	To create store maps, highlighting how items are stocked and displayed. To observe any existing in-store promotions, including pricing or communications marketing strategies. To observe customers' shopping patterns and purchases.
Mar 2012	Store owner	Participant Observation (n=1)	To shadow specific retailers that also completed an interview as they shopped at the wholesaler, to examine shopping patterns and to further understand retailers' perceptions of food choices and availability.
Mar-Apr 2012	Store owner	In-depth Interview(n=17)	To understand stocking decisions, barriers and facilitators to stocking healthier food products, relationships with customers and suppliers (e.g., wholesalers, vendors), pricing determinants, promotional strategies, and business infrastructure (e.g., Korean American business owner networks).
Mar-Apr 2012	Consumer	In-depth Interview (n=9)	To explore healthy food preferences and perceptions, food sources, purchasing decisions at corner stores, and motivators/facilitators to increase healthy food purchasing in corner stores.
Mar 2012, Oct 2012	Consumer	Focus Groups (n=2, 11 and 12 consumers, respectively)	To discuss potential promoted foods, healthy food perceptions, healthy food availability, corner store shopping experiences, relevant words or phrases denoting 'healthy' that may appeal to the consumer, strategies to increase healthy food purchasing, and feedback on study logo design. The second focus group served to refine acceptable promoted food items (via taste testing and discussion), key messages/communications formats, and acceptable price ranges to increase healthy food purchasing in corner stores.
May 2012	Consumer	Pile sorting and ranking (n=33)	To identify and refine foods and beverages for promotion. Staff collected proximity and ranking data on 24 potential promoted foods/beverages. Individual items were first free-sorted into groups by each consumer. Consumers were then asked to sort foods/beverages into 3 groups: very interested to eat, somewhat interested to eat, not going to eat.
Jan 2012 - Feb 2013	Wholesaler executives	Intervention planning meetings (n=10)	To implement stocking of new promoted foods, to refine acceptable promoted food items, to develop sustainable pricing strategies based on price sensitivity to increase healthy food sales, and to develop a protocol for applying healthy food discounts to the pricing intervention groups.

Table 5.2. Summary of Study Measures

Measures	Instrument	Baseline	Interim	Post-intervention
Impact				
Consumer-level				
Food acquisition[6]	AIQ	✓		✓
Food-related psychosocial factors[1]	AIQ	✓		✓
Food source use	AIQ, 24-hour dietary recall	✓		✓
Health beliefs & attitudes	AIQ	✓		✓
Food Assistance participation	AIQ	✓		✓
Socio-demographics	AIQ	✓		✓
Household food security	AIQ	✓		✓
Weight	AIQ	✓		✓
Height	AIQ	✓		✓
Promoted food consumption[7]	QFFQ	✓		✓
Diet	24-hour dietary recall	✓		✓
Store-level				
Stock of promoted foods[2]	SIQ, Environmental Assessment	✓	✓	✓
Sales of promoted foods[2]	SIQ, Weekly sales recall	✓	✓	✓
Food-related psychosocial factors[2]	SIQ	✓		✓
Store operations	SIQ	✓		✓
Customer & employee attributes	SIQ	✓		✓
Food acquisition & promotion	SIQ	✓		✓
Wholesale-level				
Sales of promoted foods	Wholesale sales records	✓	✓	✓
Process evaluation				
Dose delivered, reach, fidelity of consumer communications (e.g., interactive sessions)	Interventionist PE form		✓	
Dose received of consumer communications and pricing components	Consumer intervention exposure form			✓
In-store communications strategies (store, wholesaler)	Environmental assessment, Wholesale PE form	✓	✓	✓
Healthy food availability & visibility (store, wholesaler)	Environmental assessment, Wholesaler PE form	✓	✓	✓
Price discount implementation (store, wholesaler)	Environmental assessment, Wholesale sales records	✓	✓	✓
Dose received of store owner communications and pricing components	Store intervention exposure form			✓
Small store environment & infrastructure	Environmental assessment	✓	✓	✓

[6] Primary outcome
[7] Secondary outcome

CHAPTER 6. IMPLEMENTATION OF A PRICING AND COMMUNICATIONS INTERVENTION WITH FOOD WHOLESALERS TO INCREASE HEALTHY FOOD SUPPLY AND DEMAND IN BALTIMORE CITY CORNER STORES (PAPER 2)

Target journal: BMC Public Health

6.1. ABSTRACT

Background: A decade of research has shown that small store intervention programs can effectively increase healthy food availability and shift individual food behaviors in under-resourced urban areas. However, the paucity of healthier foods at the suppliers of small stores and higher prices of these foods, if available, present formidable barriers to sustaining healthier food supply. This is the first study to incorporate local food wholesalers in a nutrition intervention study to improve the food environment. We report on the formal process evaluation of the intervention at the wholesale level.

Methods: Factorial design randomized controlled trial. Twenty-four wholesale customers (small food retailers) were randomized to 1) pricing intervention, 2) communications intervention, 3) combined intervention, or 4) control. A process evaluation was conducted to assess reach, dose delivered, dose received, and fidelity using wholesale sales records, 22 wholesale observations, and 23 storeowner exposure questionnaires. Standards for reach, dose delivered and received, and fidelity was defined as low: 0–49%, moderate: 50–74%, and high: $\geq$ 75%, as defined in prior store-based studies.

Results: The intervention was implemented with high indirect reach, with 77.8% of intervention storeowners purchasing promoted foods during a 90-day period. Dose delivered of the wholesale-level communications component was high (90.7%). Dose received to specific intervention components ranged from low (36.3%) in terms of storeowners reported noticing a price decrease on promoted items, to high (94.1%) in terms of storeowners noticing promoted foods during visits to the wholesaler. Stocking fidelity was high (90.8%), while pricing fidelity was moderate (66.0%).

Conclusion: Results indicate that the food wholesale intervention was feasible to implement, with the exception of pricing discount provision on healthier snack foods, and effective in increasing healthier food availability. Future interventions should strive to work with additional types of food suppliers.

Trial Registration: ClinicalTrials.gov NCT02279849 (2/18/2014)

Key words (3-10 words): food wholesaler, small stores, obesity**,** process evaluation, food access, pricing, intervention

6.2. BACKGROUND

Obesity is one of the most serious and costly domestic public health challenges of the 21st century (Hammond & Levine, 2010; Ng et al., 2014; Wang, McPherson, Marsh, Gortmaker, & Brown, 2011). The failure to reverse its prevalence has led obesity researchers to move beyond singular behavior change strategies and to explore multi-level interventions that seek to change both the food environment and individual behavior (Roberto et al., 2015). While individuals must ultimately make the choice to consume certain foods and beverages, the current environment exploits biological, psychological, and socioeconomic vulnerabilities that encourage overconsumption of unhealthier options (Roberto et al., 2015). Low-income, urban neighborhoods are characteristically replete with energy-dense snack foods and sugar-sweetened beverages and void of nutrient-dense foods like fruits and vegetables, and residents of these neighborhoods have a greater likelihood of excess energy intakes than higher-income counterparts (Franco et al., 2008; Giskes et al., 2011; Haering & Franco, 2010; Story et al., 2008).

Store-based initiatives can improve the surrounding environment directly by increasing the supply of healthier foods (Escaron et al., 2013; Gittelsohn et al., 2012). However, small independent food stores face unique risks in terms of stocking healthier, perishable, or new items. First, food costs for small storeowners are higher compared to larger grocery stores because of lower economies of scale. Second, small stores are located in economically-deprived areas, and as such, customers of these stores may be more price-sensitive (Powell et al., 2013). Third, the quality, quantity, and variety of

healthier food options at small food store suppliers are often limited (Kim et al., under review; Song et al., 2011). Thus, the scarcity of healthier foods at the small food store suppliers, and higher prices and lower quality of these foods, if available, present formidable barriers to sustaining a healthier food supply in low-income, urban food outlets (Kim et al., under review; Shop Healthy NYC, 2013; Song et al., 2011).

Food wholesalers are major sources for small store owners in urban areas (CDC, 2014). These suppliers also face unique challenges that prevent the stocking and sale of healthier foods and facilitate the stock and sale of unhealthier ones, such as higher risks associated with stocking new products due to minimum purchase requirements with vendors, higher delivery costs for perishable foods, lack of necessary equipment to distribute perishable snacks, and perceived lack of demand for healthier foods (BHRR unpublished data; CDC, 2014).

Evidence-based methods for incorporating wholesalers in food access interventions are largely missing from the literature and are needed to inform policy and regulatory actions that can help sustain healthier food systems (Anderson-Steeves et al., 2014). To our knowledge, B'More Healthy Retail Rewards (BHRR) is the first randomized controlled trial to work with local food wholesalers to increase the supply and demand for healthier foods in Baltimore's small food stores. The goal of this paper is to describe and assess the implementation of BHRR's wholesale-level intervention through process evaluation. Specifically, we describe how well and to what extent the wholesale intervention was implemented in terms of reach, dose delivered/received, and fidelity.

6.3. METHODS

6.3.1. Setting

Baltimore is the largest city in Maryland, with one-quarter of its 622,793 residents and 30% of children living in food deserts[8], (MFSMP, 2015). This study took place in two food wholesale stores that supply small retailers in low-income, predominantly black neighborhoods of Baltimore city. Many of the neighborhood stores supplied by these wholesalers are located in food deserts or alternatively named 'food swamps' because of the pervasiveness of convenience-type food stores and carry-outs. As of 2014, there are 704 carry-outs, 960 convenience-type food stores, including 652 'corner' stores, and only 52 supermarkets (MFSMP, 2015).

6.3.2. BHRR wholesaler intervention

The Baltimore-based, B'More Healthy: Retail Rewards (BHRR) intervention trial was conducted from February to August 2013 in two wholesale stores and twenty-four corner stores, who were also wholesale customers. The corner stores are located in low-income census tracts of Baltimore City (>50% living below poverty level) where greater than 75% of residents self-identify as African American. At the time of recruitment, there were three wholesale businesses within the city that served local corner stores. Study staff attempted to recruit all three; one food wholesale company declined, citing lack of time; another wholesaler agreed to participate, but closed down before the

[8] An area where the distance to a supermarket or supermarket alternative is more than 1/4 mile, the median household in- come is at or below 185% of the Federal Poverty Level, over 30% of house- holds have no vehicle available, and the average Healthy Food Availability Index score for all food stores is low (Mapping Baltimore City's Food Environment, 2015).

intervention phase; and the third wholesale company, with two store locations, participated in the study. The intervention trial took place in the wholesalers' two Cash & Carry locations on east and west sides of the city. At baseline, all of the participating small storeowners reported regularly shopping in at least one of the store locations a minimum of once per week.

Corner stores were randomized to 1) pricing intervention, 2) communications intervention, 3) combined pricing and communications intervention, or 4) control. The two wholesale stores agreed to provide a 10-30% price discount on selected healthier food items, such as low-calorie drinks, frozen vegetables, and baked chips, at the point of purchase, to corner stores randomized to price interventions (n=12). Grant funding was used to cover the cost of wholesale-level discounts to pricing intervention storeowners. The trial was divided into three 8-10 week phases: (1) Better Beverages, (2) Healthy Staple Foods, and (3) Healthier Snacks. Wholesale staff members were asked to stock the promoted foods and beverages during the 6-month trial. A detailed description of BHRR's overall study design, including the customer and store-based interventions, is given elsewhere (Budd et al., 2015).

6.3.2.1. Store- and wholesale-level formative research

From February to April 2012, trained data collectors conducted seventeen semi-structured in-depth interviews with 15 corner storeowners to understand stocking decisions, barriers and facilitators to stocking healthier foods, customer and supplier relationships, pricing determinants, promotional strategies, and business networks (Kim et al., under review). Additionally, 17 direct observations in small stores were conducted

to observe customer purchases and shopping patterns, existing in-store promotions, and how items were stocked and displayed.

From January to March 2012, research staff conducted 13 wholesale-level in-store observations in order to examine small storeowner purchasing patterns and food selections, and to observe wholesale-level marketing strategies. Ten structured business meetings with research staff and wholesale executives (i.e., CEO, COO, and Directors of marketing and IT) were conducted from January 2012 to March 2013 in order to refine foods for promotion and to implement the stocking of new promoted foods, to finalize the percent of price discounts of each item, and to develop a protocol for applying healthy food discounts to the 12 pricing stores.

6.3.2.2. Wholesale-level intervention development

Promoted food list

Promoted foods were finalized based on consumer and storeowner requests, availability from the wholesaler's suppliers, and price point (**Table 6.1**). Initial efforts were made to stock the item types and specific brands requested by small store customers, however, this was not always possible. For example, Doritos is a high-volume snack food item in Baltimore corner stores. The wholesaler attempted to obtain Smart Snacks-compliant Reduced Fat Doritos[9] in 1 oz. packages, but was unable to acquire them from suppliers. For some foods, including frozen vegetables and fruits,

[9] As appropriated by The Healthy, Hunger-Free Kids Act of 2010, all foods sold outside of the National School Lunch Program, such as food from vending machines and school stores, must meet USDA "Smart Snacks" nutrition criteria. These snacks are not widely available for purchase outside of schools (Wilking, 2014)

storeowners could choose the types they wanted to stock out of a larger selection (i.e., choosing 3 types of frozen vegetables out of >25 choices).

Pricing component

BHRR grant funding was used to cover reduced costs of the selected foods to the 12 pricing intervention wholesale customers (storeowners). The wholesaler allowance was calculated based on projected units of promoted foods sold per week multiplied by the number of weeks each unit was promoted. We estimated that $10,000 would be sufficient to cover the reduced costs at the wholesaler. Discounts were to be applied at the register each time promoted food purchases were made from the 12 pricing storeowners from February to August 2013. The specific discounts for each promoted food and beverage were determined by wholesale and BHRR staff based on several factors, including storeowner formative research findings, price at competing wholesalers, cost of the promoted foods' unhealthier counterparts (i.e., baked chips vs. regular, coke zero vs. regular, etc.), and discounts applied in previous studies (Ball et al., 2015; Waterlander et al., 2013). Discounts ranged from 10-30% of the current retail price at the wholesale locations. From February to April, only Phase 1 drinks were discounted (and promoted), from April to June, phase 2 staple foods were added, and from June to August, all foods were to be discounted and promoted. In exchange for the discounts, pricing intervention small stores agreed to: 1) purchase the promoted foods from the wholesaler and stock them in their stores, and 2) pass a partial or full discount to their customers ("retail pass-through").

Communications component

The wholesale-level communications intervention was designed to prevent cross-contamination of corner stores randomized to the pricing only and control groups. Thus, 'hidden' materials for the communication stores included, 1) 2-inch circular stickers of the project logo marking the appropriate item on wholesaler shelves, and 2) booklets provided to storeowners that identified the aisle location of promoted foods (**Figure 6.1**). At the start of each phase (months 1, 3, 5), research staff delivered the booklets to communications storeowners, and explained to them which foods to purchase and stock, where they were located at the wholesaler, and where to stock the promoted foods in their store (i.e., front of store, etc.). As part of the store-level communications intervention, research staff were required to visit the 12 communications stores twice monthly and were available during these times to deliver any needed materials or to answer any questions from the storeowners (Budd et al., 2015). Research staff also visited both wholesaler stores at the start of each phase to place BHRR logo stickers adjacent to the promoted products and to affirm that the promoted products were present and price-marked. Storeowner-directed communications were developed using Microsoft Publisher and PowerPoint software programs.

6.3.3. Data Collection

Process data served to assess and improve intervention implementation. Implementation of program elements at wholesale level was monitored continuously during the 6-month intervention period. We modified established process evaluation constructs for public health interventions (Steckler & Linnan, 2002); *reach* - the

proportion of target members exposed to any component of the intervention, *dose delivered* - the number of intended units of each intervention component delivered by BHRR staff (as a function of efforts of the intervention providers); *dose received* - the number of times each target member was exposed to any component of the intervention (to assess the extent of engagement to intervention components), and *fidelity* - how well intervention components were delivered according to plan. **Table 6.2** outlines process evaluation measures adapted to assess the implementation of the wholesale-level intervention.

Because intervention activities (i.e., price discounts, signage) were passive and research staff did not actively interact with storeowners at wholesale stores, an *indirect* measure of *intervention reach* was determined by calculating the percentage of storeowners assigned to any intervention (n=18) that purchased at least one of the promoted healthier products (i.e., whole wheat bread, 1% milk) during the trial. Low reach was defined post hoc as 0% to 50%, moderate as 50% to 74%, and high as 75% to 100%. Additionally, we were able to determine an *indirect* measure of total *customer reach* as the percentage of total different wholesale customers that purchased a promoted product during the intervention period out of total different customers (n=3,400) that used either wholesale store between February and August 2013. *Indirect customer reach* allowed us to calculate what percentage of customers bought a promoted product because it was available, even though they were not exposed to the pricing or communications components of the intervention. A minimum standard for

total *indirect customer reach* was set at 5% of the total current customers, as defined in an earlier Baltimore study (Gittelsohn, Suratkar, et al., 2010).

Storeowner *dose delivered* was defined by how well study interventionists labeled the promoted food items (% of time labels correctly marked promoted foods) at the wholesale stores. Storeowner *dose received* was defined as the percentage (%) of intervention storeowners who successfully recalled exposure to a variety of specific wholesale-level intervention components. Dose delivered/received standards were based on another Baltimore intervention study; low was defined as 0–49%, moderate was defined as 50–74%, and high was $\geq$ 75% (Wang et al., 2013).

Stocking fidelity was defined by how often the promoted food was stocked (% of time stocked) by the wholesale stores, and *pricing fidelity* was defined by how well the price discounts were passed on to the pricing intervention stores by the wholesaler (% of time foods discounted). High fidelity was defined as having a mean frequency ≥ 75% across all promoted foods, as defined in a previous store-based intervention (Gittelsohn, Suratkar, et al., 2010). Moderate fidelity was defined as 50-74% frequency; while low was 0-49% (Gittelsohn, Suratkar, et al., 2010; Lee, et al., 2015).

6.3.3.1. Instruments

Three instruments were used to collect the wholesale-level process data.

Wholesale Sales Records

The wholesaler supplied study staff with a Microsoft Excel data file with the number of units of promoted foods sold from April 15 to July 15, 2013 by store name. Sales estimates were missing for Phase 3 foods (fresh fruit, baked chips, granola bars),

thus, process evaluation estimates for indirect reach (intervention & customer) were tabulated using data on phase 1 & 2 foods only for three of the six months of the trial. Wholesale sales records also provided data on pricing fidelity.

Wholesaler Process Evaluation Form

The wholesaler PE evaluation was completed at baseline, three times per phase, and at post-intervention for a total of 11 visits per wholesale store. The form collected information on stocking fidelity and dose delivered (communications). For each promoted food, data collectors recorded the number of units stocked, price per unit, if the price was marked (yes/no), if the BHRR logo was present (yes/no), and if the BHRR logo marked the correct item (yes/no). The process evaluator also provided additional commentary on contextual factors (e.g. visibility of items, quality of items, additional signage displayed by the wholesaler).

Storeowner Exposure Form

The Storeowner Exposure Form assessed retailer exposure (dose received) to the wholesaler pricing and communication intervention once at post-intervention. Trained data collectors asked intervention storeowners questions specific to various intervention components, such as if they noticed logos marking promoted foods at the wholesalers during shopping trips. One question assessed the frequency of wholesaler shopping visits, 10 questions assessed the visibility of BHRR logos on promoted products (yes/no), 12 questions assessed the stocking of promoted products (yes/no), and 10 questions assessed whether storeowners noticed a price decrease on any of the

promoted products (yes/no). The form also collected open-ended additional comments from the storeowners on the BHRR program.

6.3.4. Data Analysis

Descriptive statistics were performed using STATA 13.1 (STATACorp, College Station, TX) and Microsoft Excel (2010) to calculate the proportion of responses for process evaluation measures (expressed as percentages). *Intervention reach* was calculated by dividing the total number of intervention customers that purchased one promoted food or beverage between April 15 and July 15, 2013 by all 18 intervention wholesale customers. Four intervention stores (out of 18 total stores) were not listed in wholesale sales records and were assigned a 0, indicating that they did not purchase a promoted food between April 15 and July 15, 2013. Total *customer reach* was calculated by dividing the total number of customers that purchased one promoted food or beverage between April 15 and July 15, 2013 by total current wholesale customers (n=3400).

Dose delivered (communications) was calculated by first pooling categories of promoted foods. Phase 1 foods were pooled into 7 categories: 17oz bottled water cases, 24oz bottled water cases, 20oz Pepsi Next cases, 20oz Coke Zero cases, 1% milk gallon, 1% milk half-gallon, and 1% milk quart. Phase 2 foods were pooled into 11 categories: Albacore tuna (4-12-pack), Albacore tuna (24-48 pack), Chunk light tuna (4-12 pack), Chunk light tuna (24-48 pack), 100% whole wheat bread, Private label frozen blends (i.e. stir-fry, mixed vegetables), Private label frozen green vegetables (i.e., broccoli, spinach), Private label starchy vegetables (i.e., peas, corn), Premium brand frozen blends,

Premium brand frozen green vegetables, and Premium brand starchy vegetables. Phase 3 foods were pooled into 6 categories: apples, oranges, bananas, other fruits, baked chips, and low-fat granola bars.

For each store visit where a specific promoted food category was stocked, one point each was assigned if the price was marked, if the BHRR logo was present, and if it was placed in the correct location, for a total of 3 points per food category. For example, in the first process visit to one of the stores, 5 (of 7) Phase 1 promoted food categories were stocked, 4 of 5 had the price marked, 5 of 5 were labelled, and 4 of 5 of labels were marking the correct item. Thus, the dose delivered for the *first visit* in Phase 1 was 86.7% (13/15). Percentage estimates were for each food category were averaged (using the *rowmean* command in Stata) averaged over 9 visits for each store for Phase 1 drinks, 6 visits per store for Phase 2 foods, and 3 visits per store for Phase 3 foods (in order to obtain the phase-specific dose received). Foods that were not stocked were excluded from the analysis, as in the example illustrated above.

Dose received (intervention exposure) was determined by dividing the number of storeowners that answered yes to seeing specific intervention components by the number of intervention storeowners. For example, out of 17 intervention storeowners, 16 storeowners (94.1%) answered yes to at least 5 of 10 questions that asked, "Have you seen (promoted food name) during most wholesale visits?"

Promoted food *stocking fidelity* was calculated by dividing the total number of promoted food categories stocked by the total number of promoted food categories

possible, and averaged over 9 visits for each store for Phase 1 drinks, 6 visits per store for Phase 2 foods, and 3 visits per store for Phase 3 foods.

Pricing fidelity was calculated by dividing the frequency of promoted food purchases between June 1 and July 15, 2013 that were successfully discounted by the total number of promoted food purchases by pricing intervention storeowners. This data was provided by the wholesaler as an excel file that listed each unit purchase of a promoted food by pricing storeowners (n=12), along with the date and time purchased, and the discounted cost of each item. For example, if wholesale store #1 rang up 46 purchases of phase 1 drinks (i.e., cases of bottled water, Pepsi Next, Coke Zero, cartons of 1% milk) and they were discounted correctly 46 times, the stocking fidelity for Phase 1 for wholesale store #1 was 100%.

This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

6.4. RESULTS

Each of the stores in our sample (n=24) was individually owned and operated, with most of the storeowners (83%) doing their own shopping for their store. On average, storeowners reportedly used the participating wholesaler (either location) 20 times per month, another wholesaler within city limits 6 times per month, and all other chain wholesale clubs outside of city limits 10 times per month. Additionally, storeowners received an average of 16 snack or beverage deliveries per month from other vendors (not including the wholesaler), and served 165 customers per day. Water, soda, and chips were mentioned most often as having the highest gross profits (for food

sales) for the store. On average, the 18 intervention storeowners purchased promoted foods at B. Green 4.8 times per month (1x/week).

6.4.1. Reach

Indirect intervention reach: 77.8% of intervention storeowners bought at least one type of promoted food during a 90-day period of the intervention, indicating high intervention reach (**Table 6.3**). When broken down by phase, 72% and 55.6% of intervention storeowners purchased Phase 1 beverages and Phase 2 staples, respectively, indicating moderate phase-specific intervention reach.

Indirect customer reach: 29.0% of the wholesale customers purchasing at least one promoted food in a 3-month period during the trial, meeting the 5% minimum standard. When broken down by Phase, 27.2% of customers bought a Phase 1 beverage at least once in a 3-month time period and 8.7% of customers bought a Phase 2 staple food at least once during the trial.

Purchase records on Phase 3 snacks were not provided by the wholesaler, therefore, intervention and customer reach for this phase were not measured.

6.4.2. Dose delivered (communications)

Dose delivered of the wholesale-level communications component (% of time labels correctly marked promoted foods and beverages) was high with an average of 90.7% for total promoted foods across both stores (**Table 6.3**). Dose delivered percentage estimates ranged from 57.1 to 100.0 with a mean of 89.3(±10.4) for Phase 1 beverages, from 96.3 to 100.0 with a mean of 99.2(±1.5) for Phase 2 staple foods, and from 50.0 to 100.0 with a mean of 82.7(±20.3) for Phase 3 snacks.

6.4.3. Dose received (storeowner intervention exposure)

Overall storeowner exposure to intervention components was moderate (72.8%) (**Table 6.4**). Of all intervention storeowners, 94.1% purchased foods at the wholesaler in the past week and saw $\geq$ 5 promoted food products during wholesaler shopping visits, indicating high exposure for these components. Of communications intervention storeowners, 66.7% saw BHRR logos marking $\geq$ 5 promoted foods during visits, indicating moderate exposure. Of pricing storeowners, 36% noticed a price decrease on any of the promoted products at any time during the intervention period, indicating low dose received for this component.

6.4.4. Fidelity

Stocking of promoted foods

At baseline, the two wholesale stores stocked 6 out of 7 Phase 1 beverages (85.7%), 7 of 11 phase 2 foods (63.6%), and 3 of 6 Phase 3 snacks (50%). At post-intervention, wholesale stores stocked 6.5 out of 7 phase 1 beverages (92.9%), 11 of 11 phase 2 foods (100%), and 5 of 6 phase 3 foods (83%). An increase of 6.5 foods (categories) or a 41% increase in stocking of promoted foods was found from baseline to post-intervention. Stocking of total promoted foods therefore achieved high fidelity with an average of 90.8% across all foods and stores (**Table 6.3**). Stocking scores ranged from 5 to 7 with a mean of 6.4(±0.7) for Phase 1 beverages, from 8 to 11 with a mean of 10.1(±1.0) for Phase 2 staple foods, and from 4 to 6 with a mean of 5.2(±0.8) for Phase 3 snacks.

Pricing intervention

Fidelity of providing the pricing intervention by wholesalers was moderate, with the 12 targeted small store owners receiving discounts on promoted foods 66% of the time. Pricing intervention fidelity was high (100%) during Phases 1 and 2 for promoted beverages and staple foods (Phase 1 & 2 items). However, Phase 3 snacks foods were not discounted at all during the trial (0%), due to nonfulfillment of the wholesaler to program the discounts for these foods into their electronic point of sale (EPOS) system.

6.5. DISCUSSION

This is the first study to report on the feasibility and implementation of a pricing and communications intervention study with food wholesalers to increase healthier food supply and demand. A few food access initiatives have partnered with local wholesalers in order to bring healthier options to urban food stores, however prior to this study, none have evaluated implementation nor impact of these initiatives (Ashbrook, Roberts, Karpyn & Piett, 2008; CDC, 2014; Shop Healthy NYC!, 2013). Overall, the wholesale-level program was implemented with moderate exposure (dose received) and pricing fidelity, and high reach, stocking fidelity, and dose delivered (communications). The study presented here illustrates that working with food suppliers is not only feasible, but that inclusion of food wholesalers in food access interventions can lead to immediate improvement in the supply of healthier foods.

Since this was the first process evaluation study to be conducted with food wholesalers, we relied on process standards used in other Baltimore-based or food retail studies (Gittelsohn et al., 2010; Lee-Kwan et al., 2013; Wang et al., 2013), as well as establishing new standards specific to evaluation of food wholesaler interventions.

Intervention reach of the wholesale-level intervention to storeowners was assessed indirectly by counting promoted food purchases, as neither BHRR staff nor wholesale-staff had direct contact with storeowners at wholesale stores (due to the necessity to minimize communications to non-communications stores). Additionally, *wholesale staff* exposure to intervention components was not assessed.

With respect to the 18 intervention storeowners, overall indirect reach ('intervention reach') was high, and phase-specific indirect reach was moderate. It is important to note that four intervention storeowners were not found under their store names in the wholesaler database, but storeowner survey interviews affirmed that they did purchase promoted foods at the wholesaler during the intervention period. Furthermore, direct deliveries made by the wholesaler to the intervention stores were not captured. In assigning a promoted food purchase of 0 for the four missing storeowners, intervention reach (as the % of intervention storeowners that purchased promoted foods) was down-weighted. When the four storeowners were dropped from the analyses, intervention reach was 92.9% (13/14) for Phase 1 drinks, 71.4% for Phase 2 foods (10/14), and 100% overall (14/14). We were unable to obtain estimates for Phase 3 snack foods, however, we believe that the standard for high reach would have been met (≥75% of intervention storeowners purchasing a Phase 3 snack food) because a separate evaluation at the small store-level found that stocking of promoted snack foods increased in all intervention corner stores (see Section 7.4).

Overall indirect customer reach was also high for Phase 1 & 2 foods, and combined. This metric was useful to gain a perspective on how many non-targeted

customers purchased promoted foods, and also to serve as a comparison measure with promoted food purchasing of intervention storeowners. Purchasing of staple foods (i.e., frozen vegetables, whole wheat bread, canned tuna in water) was lower on all process evaluation measures when compared to Phase 1 drinks, indicating that small food stores are used more frequently for impulse drink (and snack) purchases, than for household grocery food shopping.

Though there are no prior wholesaler interventions with which to compare results, we were able to compare dose delivered with a recently published process evaluation study of a supermarket intervention trial in Baltimore, which is owned by our wholesaler (Lee et al., 2015). Dose delivered of the wholesale communications component by BHRR staff (91% overall) was 20% higher than averages for the supermarket intervention (71% overall) (Lee et al., 2015).

Dose received (store exposure to the wholesaler intervention) was moderate overall (72.8%), but ranged from low price reduction exposure (36.3%) to high promoted food visibility exposure (94.1%). Two pricing intervention storeowners commented that the price discounts were too small to notice, one pricing storeowner commented that promoted food prices fluctuated throughout the intervention, and another said that he didn't notice because he didn't look at his receipts. We believe that those storeowners that noticed the price discounts (36.3%) were those that frequently checked their receipts, and the storeowners that did not notice the price discounts may have been looking only at the displayed price tag, which did not reflect the discount. In addition, two intervention storeowners received deliveries from the wholesaler and did

not pick up items from the store. Thus, these storeowners were not exposed to the communications portion of the intervention and may not have noticed newly stocked promoted foods.

Stocking fidelity was high (90.8%), indicating that the wholesaler carried out their plan to stock new promoted food items. In the supermarket study, stocking of 475 promoted food items achieved high fidelity (88.0%), which is similar to our results (Lee et al., 2015). Pricing fidelity was moderate (66%), but ranged from high (100%) for Phase 1 & 2 promoted foods to low (0%) for Phase 3 snack foods. No prior process evaluation study has evaluated implementation of a store-directed pricing program, so we had no basis for comparison. However, programming only 12 stores to receive discounts on promoted foods was initially difficult for the wholesaler and delayed the intervention start date until February. The failure of the wholesaler to discount the Phase 3 snacks during the 5th month of the intervention period was a direct result of limited time and staffing resources to program the discounts into the electronic point of sale (EPOS) system and was not intentional.

There were a few notable facilitators that contributed to the success of the intervention implementation. First, the CEO of the wholesale business had a vested interest in the health of the community and was extremely amenable to introducing new healthier foods in his stores. As a result of his leadership, the other wholesale staff was cooperative and participated in meetings and interviews, when requested. Second, we selected a finite number of promoted healthier foods and beverages, which allowed research staff to track the stocking, visibility, and BHRR logo placement quickly and

easily. This finding agrees with recommendations from the supermarket intervention, which suggested to promote the number of items commiserate with availability of intervention staff, to reduce time burden (Lee et al., 2015). Third, the research staff remained constant throughout the planning, intervention implementation, and evaluation stages, so that intervention delivery was consistent and rapport with the wholesale staff was strong. Other process evaluation studies have cited the importance rapport building with food retailers (Gittelsohn et al., 2010; Lee-Kwan et al., 2013).

There were also some challenges to intervention implementation. First, the programming of the price discounts in the EPOS system was complex and time-consuming. The particular EPOS system had not been previously programmed to give specific wholesale members discounts. Unlike most supermarkets or other chain wholesalers that use scan-enabled 'club' or 'rewards' cards (i.e., Sam's Plus, Safeway Club) to provide discounts to specific customers, our wholesaler did not have a loyalty program and all members paid the same price for items. The wholesaler had to call in an IT specialist to program the EPOS and it took several visits to resolve the issue. Our intervention start date was originally planned for December 2012, but had to be pushed to February 2013 because of the delays in administering the discounts to pricing customers.

Second, there were complications in obtaining some of the new promoted foods from the wholesale suppliers, which also led to program delays. In particular, the wholesaler had difficulty in obtaining smaller quantities of promoted products (i.e., 6-pack beverages vs. 24-pack). Obtaining smaller case sizes was important at the study's

initiation in order to mitigate the perceived risk many storeowners felt when trying to stock new products. In order to prevent further program delays, we promoted 24-ct cases of promoted beverages, and 4 lb. bags of fruit, even though purchasing bulk items presented a risk for storeowners. We were able to obtain single bags of baked potato chips, however, they were double the cost of similar-size fried versions. The same cost issue has been noted in a Washington DC corner store initiative that cited that the average cost of baked potato chips in corner stores were $1 compared to $0.25 for the fried version (Ashbrook et al., 2008). In both Baltimore and Washington DC urban settings, the cost differential appears to not be a problem of mark-up at the small store- or wholesale-levels, but that the actual cost of the healthier baked chip is higher at the manufacturer-level.

Finally, Phase 3 snack food discounts were not applied to pricing storeowners during months 5 and 6 of the intervention. We believe this is a direct result of wholesale staffing and time resources stretched too thin, and that the wholesale communications manager in charge of overseeing the discount programming had more important job priorities. Interestingly, a similar result was found in the supermarket intervention, citing a lack of support from the store manager due to dual loyalties of being asked to help implement the intervention and being responsible for day-to-day business operations (Lee et al., 2015). Future research studies with business owners should recognize this limitation and attempt to minimize time-burdens, when possible. For example, staggering of promoted food phases and price-discounts made sense in theory, so intervention storeowners could introduce foods in their stores gradually and

minimize risk. However, it created more work for the wholesaler, who had to then program discounts in the EPOS system three separate times, instead of once.

Limitations

This study had some limitations. We relied on the wholesaler to provide sales and pricing data from their databases, and the data that was provided was missing estimates for all promoted snack foods. Therefore, we could not provide process data for intervention reach, customer reach, and dose received for Phase 3 foods. The wholesaler also did not provide baseline (January 2013) or post-intervention sales data (August 2013) on promoted foods so that we could discern the change in sales of promoted foods over time. Additionally, the wholesale reports provided sales information for a 3-month window of time (April 15-July 15, 2013), instead of for the entire 6-month intervention period (February-August 2013), leading to more conservative estimates for intervention and customer reach.

Another limitation was that the wholesaler intervention was implemented in one wholesale business, so that process evaluation results in two stores may be unique and cannot be compared to other wholesale businesses. Additionally, we initially assumed that small storeowners shop at wholesalers within city limits and seldom use wholesale clubs like Costco and Sam's Club, located outside of the city. However, we found that storeowners shop at multiple locations, including several wholesale clubs, supermarkets, and specialty stores (i.e., meat stores, etc.). Future interventions should attempt to work with other wholesale businesses and other types of food suppliers; a

related multilevel systems trial that is working with three wholesalers is currently underway in Baltimore (Gittelsohn et al., 2014).

6.5.1. Conclusions

A recent obesity prevention review article noted that incorporation of food distributors and producers were largely missing from public health interventions and research (Anderson-Steeves et al., 2014). This study fills this gap as the first intervention study to work with a local food wholesaler and to report process evaluation findings. The BHRR wholesaler intervention was successfully implemented in the two wholesale stores, despite program delays, price programming difficulties, and wholesale-staff time constraints. Involvement of food wholesalers and other food suppliers in food access initiatives is an obvious and necessary approach to ensure adequate stock, high quality, and fair prices of healthy foods. Future interventions should also collaborate with snack and beverage vendors, who deliver goods to small stores weekly, making it easy for storeowners to stock their items (Andreyeva, Middelton, Long, Luedicke, & Scwartz, 2011). These suppliers, often part of national or multi-national brands, have the infrastructure and communications materials to promote their healthier product lines. Food access initiatives should continue to create supportive environments for storeowners so that they feel confident that they can stock and sell healthier food items. A consolidated effort including distributors, vendors, producers, and manufacturers is needed.

List of abbreviations

BHRR: B'More Healthy: Retail Rewards; PE: Process Evaluation, EPOS: electronic point of sale

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Table 6.1. Promoted foods and phases

Phase	Promoted Food/Beverage
Phase 1: Better Beverages	1% Milk (3 sizes)
	Deer Park Water (2 sizes)
	Pepsi Next*
	Coke Zero
Phase 2: Healthy Essentials	100% Whole Wheat Bread
	Chunk Lite Tuna in water (4-12 pack, 24-48 pack)
	Albacore Tuna in Water (4-12 pack*, 24-48 pack)
	Premium brand Frozen Vegetables (Hanover, Bird's Eye)*
	Private label Frozen Vegetables (Essential Everyday)
Phase 3: Low Fat Snack Attack!	Bananas
	Apples
	Oranges
	Other fruits*
	Quaker Oats low fat granola bars*
	Utz Plain* or BBQ Baked Potato Chips*

*New items

BHRR logo stickers

Phase 3 pamphlet for storeowners

Figure 6.1.Wholesale communications materials

Table 6.2. Process Evaluation Measures

Process measure	Definition	Method
Reach (indirect)	% targeted stores that received any intervention	% of intervention storeowners that purchased ≥ 1 of the promoted foods (out of 18 intervention stores) % of any wholesale customer that purchased ≥ 1 of the promoted foods
Dose delivered	% of intended intervention components delivered by research staff to stores	% of time labels correctly marked promoted foods (out of all wholesale visits)
Dose received	% intervention components that storeowners report receiving	% of intervention storeowners who successfully recalled exposure to pricing or communications intervention components
Fidelity	How well intervention components were delivered according to plan	% of time promoted foods were stocked by wholesale stores % of time promoted foods discounted to pricing stores

Table 6.3. Results from BHRR wholesale-level process evaluation: Reach, fidelity, dose delivered (%)

Component measured	Phase 1 drinks			Phase 2 foods			Phase 3 foods			Overall			Standard
	Store 1	Store 2	Total	Store 1	Store 2	Total	Store 1	Store 2	Total	Store 1	Store 2	Total	
Intervention reach	38.9 (7/18)	33.3 (6/18)	72.0 (13/18)	27.8 (5/18)	27.8 (5/18)	55.6 (10/18)	N/A	N/A	N/A	50.0[a] (9/18)	38.9[a] (7/18)	77.8[a] (14/18)	Low: 0-49% Moderate: 50-74% High: 75-100%
Customer reach[b]	13.1 (444/3400)	14.1 (481/3400)	27.2 (925/3400)	4.7 (159/3400)	4.0 (136/3400)	8.7 (295/3400)	N/A	N/A	N/A	14.1 (481/3400)	14.9 (506/3400)	29.0 (987/3400)	Minimum: 5%
Dose delivered (communications)	85.0[c]	93.6[c]	89.3[c]	98.3[c]	100.0[c]	99.2[c]	83.3[c]	82.0[c]	82.7[c]	89.4[c]	91.9[c]	90.7[c]	Low: 0-49% Moderate: 50-74% High: 75-100%
Stocking fidelity (healthy food availability)	90.5 (57/63)	92.1 (58/63)	91.3 (115/126)	93.9 (62/66)	89.4 (59/66)	91.7 (121/132)	77.8 (14/18)	94.4 (17/18)	86.1 (31/36)	87.4[c]	91.2[c]	90.8[c]	Low: 0-49% Moderate: 50-74% High: 75-100%
Pricing fidelity[d]	100.0 (46/46)	100.0 (118/118)	100.0 (164/164)	100.0 (14/14)	100.0 (37/37)	100.0 (51/51)	0	0	0	66.0[c]	66.0[c]	66.0[c]	Low: 0-49% Moderate: 50-74% High: 75-100%

[a]Totals reflect the percentage of different intervention storeowners that purchased either Phase 1 or 2 foods from 4/15 - 7/15/13 out of all intervention storeowners.

[b]Denominator is the total number of current wholesale members. Numerator is the number of members to purchase promoted foods from 4/15 - 7/15/13.

[c] Estimates were obtained by averaging each food category or phase's percentage totals in order to assign equal weights for each category/phase, therefore, numerators and denominators are not listed.

[d]Data obtained from a 6/1 - 7/15/13 cross-section of wholesale sales records. Data was not recorded for Phase 3 snack foods, however, wholesale staff affirmed that they were not discounted at any point during the trial. Denominator reflects the total number of foods purchased.

Table 6.4. Store exposure to wholesaler intervention (dose received)

	%	Low: 0-49% Moderate: 50-74% High: 75-100%
Have you purchased foods at the participating wholesaler in the past 7 days?[a]	94.1	
Did you see ≥ 5 promoted products during visits?[a]	94.1	
Have you seen the BHRR logos marking ≥ 5 promoted products?[b]	66.7	
Have you noticed a price decrease in any of the promoted products?[c]	36.3	
Total dose received (storeowner exposure)	**72.8**	

[a]All intervention stores (n=17)

[b]Communications stores (n=12)

[c]Pricing stores (n=11)

CHAPTER 7. STORE-DIRECTED PRICE PROMOTIONS AND COMMUNICATIONS STRATEGIES IMPROVE HEALTHIER FOOD SUPPLY AND DEMAND: IMPACT RESULTS FROM A BALTIMORE CITY STORE-INTERVENTION TRIAL (PAPER 3)

Target Journal: Public Health Nutrition

7.1. ABSTRACT

Objective: Improving food environments and increasing access to healthy foods have been identified as two key strategies for obesity prevention and reduction. Small food store interventions show promise to increase healthy food access in under-resourced areas, however, none have tested the impact of price discounts on healthy food supply and demand. We tested the impact of store-directed price discounts and communications strategies, separately and combined, on the stocking, sales, and prices of healthier foods, and on storeowner psychosocial factors.

Design: Factorial design randomized controlled trial in small food stores (n=24).

Setting: Corner stores in low-income, predominantly black, food-desert neighborhoods of Baltimore City, MD.

Subjects: Stores were randomized to 1) pricing intervention (G1), 2) communications intervention (G2), 3) combined intervention (G3), or 4) control (G4). Stores that received the pricing intervention were given a 10-30% price discount by wholesalers on selected healthier food items, such as fresh fruits, frozen vegetables, and baked chips, at the point of purchase from two food wholesale stores during the 6-month trial.

Communications stores received visual and interactive materials to promote healthy items, including signage, taste tests, and refrigerators.

Results: All three intervention groups showed significantly increased stocking scores for promoted foods, versus control group (G1: β=3.6 (95% CI 1.3, 5.9); G2: β=2.5 (95% CI 0.7, 4.3); G3: β=3.5 (95% CI 0.8, 6.2). There was a significant treatment effect for daily unit sales of healthy snacks (β=6.4, 95% CI 0.9 11.9) and prices of healthy staple foods (β=-0.49, 95% CI -0.9 -0.03) for the combined pricing and communications intervention versus control, but not for other intervention groups. There were no significant intervention effects on storeowner psychosocial factors versus control.

Conclusions: All interventions were successful in increasing the stock of healthier foods. The combined pricing/communications intervention was effective in increasing sales of healthier snacks, even though discounts on snacks were not passed to the consumer. Experimental research in small store settings is needed to understand the mechanisms by which store-directed price promotions can increase healthy food supply and demand.

Trial Registration: ClinicalTrials.gov NCT02279849 (2/18/2014)

Key words (4 phrases, up to 3 words each): obesity**,** food stores, trade promotions, food access interventions, pricing interventions

7.2. INTRODUCTION

Obesity is a profound problem both domestically and worldwide, causing those afflicted to lead shorter and less healthy lives and costing the United States an estimated $147 billion per year in direct healthcare costs (Hammond & Levine, 2010). Public health experts recognize that changes in the food system over the last 40 years are a major driver of the obesity epidemic, and reversal or prevention of the epidemic is unlikely without improvements at multiple levels of the food environment (Swinburn et al., 2011). In the United States, populations with low socioeconomic status are disproportionately burdened by obesity and diet-related diseases, partially due to limited food resources within surrounding neighborhoods (Giskes et al., 2011; Lovasi et al., 2009; Neff et al., 2009). Public health interventions that have sought to improve healthy food availability and access in small food stores located in low-income areas have seen moderate success, however, there is little to no research on the effects of price manipulations on consumer food behaviors in these settings, which operate with higher food costs and smaller economies of scale, and whose patrons are likely more price-sensitive (Gittelsohn et al., 2012; Powell & Chaloupka, 2009). Policy-driven 'sin' taxes on unhealthier food items hold promise, but are opposed by the food industry (Novak & Brownell, 2012; Powell & Chaloupka, 2009). Conversely, subsidization of fruits and vegetables to improve availability and consumption is effective, but costly, and may not create total calorie deficits if consumption of calorie-dense foods, like chips and sodas, are not simultaneously reduced (via substitution effects) (An, 2013; Barlett et al., 2014; Thow, Down & Jan, 2014).

Employing industry-driven trade promotions is an alternative approach and has not been tested as an obesity prevention strategy. 'Trade promotions' are deals offered by manufacturers to retailers, rather than to directly to consumers (i.e., 'consumer promotions' (Gomez et al., 2007). They are ubiquitous in supermarkets and are used to increase brand loyalty and boost sales of certain products during specific periods of time (Maxwell et al., 2012; Poddar & Donthu, 2011; Tsao et al., 2013). A performance-based allowance (PBA) is a type of trade promotion whereby money is paid to the retailer for a requested activity by the supplier (Gomez et al., 2007; The Basics, 2009). Retailers benefit from performance allowances in two ways; either buying at discounted prices and selling at normal prices or increasing sales volume when they pass on some of the saving to customers ("retail pass-through"). A snack supplier may offer a price discounts on future cases of product if the retailer reaches a certain sales minimum (also called movement allowance), or beverage supplier pay money for products to be placed in the front of the store (also called slotting allowance). In lieu of, or, in addition to targeted fruit and vegetable subsidies, food suppliers can use PBAs to shift consumer food preferences towards their 'better-for-you' or lower calorie product lines. These products may not be considered healthy by some nutrition experts, but they can provide the calorie reduction needed for long-term weight loss and may also help 'retrain' consumers' taste preferences towards healthier products (Wansink & Peters, 2006). Additionally, recent research has shown that industry-led initiatives to reduce calories through portion size reductions, reformulation, and marketing have resulted in superior sales and profit growth (Cardello et al., 2014). This approach would provide the food

industry a mechanism by which to contribute to obesity reduction efforts without government intervention, while supporting corporate bottom lines.

The Baltimore Healthy Retail Rewards (BHRR) intervention trial sought to increase the availability and sales of select healthy foods in Baltimore's small food stores by testing PBAs and promotional strategies. PBAs are underutilized in Baltimore's small urban food stores to increase food sales, but are used heavily by the tobacco industry (Budd N., unpublished data, 2012; John et al., 2009). To our knowledge, this study is the first store-based intervention trial to incorporate local food wholesalers, and first trial to test the effect of trade promotions on healthy food supply and demand in small stores. We examined the effects of performance-based monetary incentives (10-30% wholesale discount) and communications strategies, separately and combined, on small store stocking, reported sales, and prices of promoted healthier foods, and on related storeowner psychosocial variables. Our study's hypothesis was that intervention stores (owners) would demonstrate significantly greater change in promoted food stocking, sales, and psychosocial factor scores compared to control stores from baseline to post-intervention, and that combined intervention stores (n=6) would see the greatest change compared to single intervention stores and control. Our secondary research question assessed whether storeowners in the pricing intervention complied with the agreements of the performance-based allowance (stocking the item and retail pass-through).

7.3. METHODS

7.3.1. Study setting, design, and intervention strategies

The BHRR intervention was conducted from February to August 2013 in twenty-four corner stores and two wholesale stores in Baltimore City. The stores are located in low-income census tracts of Baltimore City (>50% living below poverty level) and service primary black customers (>75%). BHRR worked directly with one wholesaler at both of their locations on east and west sides of the city. The 6-month intervention was divided into three 8-10 week phases: (1) Better Beverages, (2) Healthier Staple Foods (or ' Essentials'), and (3) Healthier Snacks (Budd et al., 2015). Each phase built upon the previous, so that by the 3rd phase, all foods and beverages were promoted simultaneously. BHRR had a 2x2 factorial design whereby stores were randomly allocated to one of 4 treatment groups: pricing (G1) (n=6), communications (G2) (n=6), communications and pricing (G3) (n=6), and control (G4) (n=6).

Pricing intervention stores (G1 & G3) were given a 10-30% price discount on selected healthier food items, such as reduced calorie sodas, frozen vegetables, and whole wheat bread, at the point of purchase from two food wholesale stores during the 6-month trial. Storeowners receiving the pricing discounts (i.e. those in the pricing alone and combination price & communication groups) were asked to 1) stock the item, and 2) to pass partial or full discounts to customers (retail pass-through). BHRR grant funding was used to cover reduced costs of the selected foods at the wholesale stores.

Communications stores (G2 & G3) received visual and interactive materials to promote healthy items, including signage, taste tests, and refrigerators. Additionally,

communications stores also received laminated lists of promoted foods by phase that included information on their locations and prices at the wholesaler, and added suggestions on how to promote the foods in their stores using BHRR materials (i.e., shelf talkers, bags, etc.). At both wholesale stores, BHRR logo stickers were affixed on the shelves above or adjacent to the promoted products, so that intervention storeowners could easily recognize them.

A detailed description of BHRR's study design is given elsewhere (Budd et al., 2015). Intervention phases and treatment arms are outlined in **Table 7.1.**

7.3.2. Data collection

The Store-impact Questionnaire (SIQ) was administered to store owners at baseline (Dec 2012 –January 2013) and post-intervention (Nov 2013-Jan 2014), and gathered information on store (owner) demographic factors, sales and stocking of 15 promoted foods[10], price of promoted foods, store-owner psychosocial factors including self-efficacy and intentions to stock, promote, and sell promoted beverages/foods, and outcome expectations related to promoted food sales and overall program impact. The SIQ is a pre-tested, standardized instrument that has been used previously in Baltimore stores (Budd et al., 2015, Gittelsohn et al., 2009; Song et al., 2009).

Interviews with storeowners were conducted by the authors and other members of the research staff. Interviews with Korean-speaking owners were conducted in

[10] Deer Park water, Pepsi Next, Coke Zero, Rutter's 1% milk, Old Tyme 100% Whole Wheat Bread, Chunk Light tuna in water, Albacore tuna in water, Hanover or Bird's Eye mixed frozen vegetables, Hanover or Bird's Eye green frozen vegetables, Hanover or Bird's Eye starchy frozen vegetables, apples, oranges, bananas, Quaker Oats low-fat granola bars, Utz baked chips

Korean and translated to English by Korean-speaking research staff. English versions of forms were used for all data collection.

7.3.3. Data analysis

Dependent Variables

All outcomes of interest were treated as continuous variables and include store stocking sales, and price changes of promoted food items, and related storeowner psychosocial factors. Daily unit sales were assessed with 15 questions (i.e. How many *units* of Utz baked potato chips were sold PER DAY in the last 30 days?). Units were summed to create a daily total. Stocking was assessed with 15 questions (i.e., "Were Utz baked potato chips in stock in the last 30 days?") and verified visually by data collectors. One point was given for each of the 15 foods stocked in the last 30 days. For example, a store that stocked frozen broccoli, coke zero, bottled water, and fresh apples obtained a total stocking score of 4. Points were summed to create a stocking score (possible range 0-15).

Prices of promoted foods that were stocked at both baseline and post-intervention collections were summed to create total food prices for each phase. If a food was not stocked at both collections, a 0 was imputed for both collections so that total change in price from baseline was 0. If a food was not stocked for one collection but was for another, then the same price was imputed for both collections so that total change in price from baseline was 0.

Each of the psychosocial constructs (i.e., self-efficacy to stock, intentions to stock, outcome expectations for sales, outcome expectations for overall program

impact) were assessed with 15 questions each, using a 5-point Likert scale that included: Strongly Agree (2), Agree (1), Undecided (0), Disagree (-1), Strongly Disagree (-2). Responses were summed to create the scale score for each category, each with a scale range of -30 to 30 points. All scales were tested for reliability using Cronbach's alpha (α). An alpha of ≥ 0.7 was used to confirm good internal consistency and reliability (DeVellis, 2003). Fifteen questions evaluated self-efficacy for stocking promoted foods (i.e., "I can stock 100% whole wheat bread in my store") (Mean baseline score: 10.0±8.2; α = 0.84). Fifteen questions evaluated intentions to sustain stocking of promoted foods (i.e., "I will stock frozen vegetables in my store after the program is completed") (Mean baseline score: 12.5±8.7; α = 0.87). Outcome expectations for promoted food sales was assessed with 15 questions (i.e., "Baked potato chips will sell well in my store") (Mean baseline score: 6.1±7.3; α = 0.73). Outcome expectations on overall program impact was assessed with 15 questions (i.e., "If I receive a produce refrigerator for my store, fresh fruit/vegetable sales will increase") (Mean baseline score: 10.0±8.8; α = 0.93).

Baseline Differences

Demographic measures included gender, self-reported race/ethnicity, number of employees and years in business, WIC and SNAP participation, sells alcohol/tobacco, and store-related operational and structural characteristics. Differences in baseline characteristics by treatment group were compared using Fisher's exact tests (for expected cell frequencies of <5) for dichotomous outcomes (i.e., WIC/SNAP participation, sells alcohol/tobacco, gender). Exploratory data analysis found that ANOVA assumptions of heteroscedasticity and non-normality were violated, therefore

Kruskal Wallis H tests were used to determine if there were any significant differences in continuous baseline characteristics (i.e., # of years in business, frequency of food deliveries, etc.) and outcomes for intervention groups versus control.

Impact Analysis

To evaluate the effect of the interventions on storeowner psychosocial factors, and prices, stocking and sales of promoted foods, regression based difference-in-difference models using linear generalized estimating equations with an independent correlation structure and robust standard errors were used to account for within-subject correlation over time. Although we found no statistically significant differences in baseline characteristics according to intervention group, we suspect we had limited power to detect differences due to the relatively small sample size. For this reason, to test treatment effects, we employed difference-in-difference estimators to guard against baseline differences confounding the treatment effects. Working correlation structure was selected using quasi-likelihood under independence model criterion (QIC) (Cui, 2007). Outcome measures were analyzed as dependent variables with intervention group, time, and a group*time interaction term as independent variables. The coefficient on the group*time variables are the "difference-in-difference" estimates, and its p-value represents the test of whether the change in the outcome over time was statistically different from the change in the same outcome over time in the control group. STATA 13.1 statistical software package (College Station, TX) was used for all analyses; statistical tests were 2-sided with a significance level of $p \leq .05$. One store (owner) allocated to the pricing only group dropped during Phase 1 of the study due to

health reasons and post-intervention data was not obtained. Therefore, impact data was analyzed for 23 stores total. This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and informed consent was obtained from all respondents.

7.4. RESULTS

7.4.1. Baseline characteristics and outcome variables

We found no statistically significant differences in baseline characteristics (**Table 7.2**) or outcomes (**Table 7.3**) between intervention groups and control.

7.4.2. Change in healthy food availability (stocking of promoted foods)

Positive intervention effects were observed for the total stocking score for all promoted foods for all treatment groups versus the control group. Pricing only, communications only, and combined stores saw a 3.6, 2.5, and 3.5 unit score increase in stocking of promoted food types, respectively, compared to control (**Table 7.3**). Both pricing discount groups were associated with a larger effect than the communication's group, though post-hoc tests did not find a statistically significant difference in magnitude between the three intervention types. When assessed by phase, intervention effects were significant for only Phase 1 (Better Beverages) and 3 (Healthy Snacks), but not for 2 (Healthy Essentials).

7.4.3. Changes in sales of promoted foods

Sales of total promoted foods in the pricing only and combined groups increased from baseline to intervention compared to the control group, but the changes were not

statistically significant. Sales of total promoted foods in the communications only group decreased compared to control, but changes were also not significant. Further examination on sales impact by food phase found that there was a significant positive intervention effect of the combined pricing & communications intervention on Healthy Snack sales (Phase 3 products), observed as an increase of 6.4 units sold per day, versus control. Healthier beverage sales (i.e., water, low calorie sodas) also increased in the pricing only and combined groups, but these changes were not significant when compared to control. Sales of promoted staple foods (i.e., "Healthy Essentials": whole wheat bread, canned tuna in water, frozen vegetables) declined in all four groups, with no treatment effect observed between intervention and control.

7.4.4. Changes in promoted food prices (pass-through)

Our secondary research question assessed whether the price discounts experienced by storeowners at the wholesale-level were passed on to the customer (pass-through). There was a significant treatment effect of the combined pricing & communications intervention on staple foods prices (e.g., price decreased by $0.47 for all phase 2 foods combined) versus control, but no effects were found for the other intervention groups. There were no other significant intervention effects on total promoted food prices compared to the control group.

7.4.5. Change in storeowners' psychosocial variables

In the pricing only, communications only, and control groups, there were no statistically significant treatment effects on psychosocial factors between intervention

groups and control for all foods combined. However, intentions to sustain stock of Phase 3 foods increased in all intervention groups compared to control, trending towards significance (G1: β=2.6, 95% CI: -0.7 5.8, p=0.1; G2: β=3.1, 95% CI: -0.3 6.5, p=0.07, G3: β=2.8, 95% CI: -0.2 5.7, p=0.06). Intentions to sustain stock of Phase 2 foods for G1 and G2 groups actually decreased compared to control, trending towards significance (G1: β=-5.4, 95% CI: -12.0 1.2, p=0.1; G2: β=-4.4, 95% CI: -9.5 0.7, p=0.09). There was a statistically significant decrease in outcome expectations for sales of Phase 1 drinks for G1 and G2 stores compared to control (G1: β=-3.4, 95% CI: 4.9 -1.8, p=0.001; G2: β=-2.6, 95% CI: -5.2 -0.0, p=0.05).

7.5. DISCUSSION

This is the first study to evaluate the effect of store-directed price discounts on small store supply and sales of healthier foods, and the first to do so through wholesaler-supplied trade promotions. Additionally, this study fills gaps in the literature that have called for factorial-designed intervention studies to show the interactive effects of price changes with additional non-price interventions (Epstein et al., 2012).

We found that all intervention groups (G1, G2, G3) saw significant increases in stocking of promoted foods compared to control. Second, we found statistically significant increases in the sales of Phase 3 snack foods in the combined (G3) intervention group compared to control, and non-significant increases in G3 sales for all foods combined. No treatment effects were seen for sales in the pricing only (G1) or communications only (G2) groups. Third, the increase in total sales was seen despite a lack of evidence of retail pass-through to customers in the combined (G3) group

compared to control. Finally, there were no significant intervention effects on overall storeowner psychosocial factor scores compared to control, although treatment effects were found for phase-specific storeowner psychosocial factors.

Store-directed communications (e.g., small produce refrigerators, shelf talkers, posters, wholesale pamphlets) and store-directed price discounts (10-30%) on promoted foods, separately and combined, encouraged increased stocking of healthier foods by store owners. Combined pricing and communications intervention effects were not statistically different than intervention effects for either pricing- or communications-only groups, showing that combined effects were not more than additive for promoted food stocking. This study is consistent with other small store studies that have found consistent improvements in promoted food stocking through multiple approaches (i.e., coupons, structural change, and health communications) (Gittelsohn et al., 2012). The stock of promoted foods within small stores declined from baseline in the control group (while increasing in all intervention groups), demonstrating that simply ensuring the availability of healthier promoted foods at the participating wholesaler was insufficient to increase their purchase by store-owners.

When looking specifically at the different types of healthier options promoted in the 3 different intervention phases, statistically significant increases were seen in all intervention groups for Phase 1 Beverages and Phase 3 Snacks. However, no improvement was observed in the availability of Phase 2 Healthy Essentials (whole wheat bread, canned tuna, and frozen vegetables). We speculate several reasons for this. First, the discounted wholesale price of a loaf of whole wheat bread was still $1

more than white or split top wheat bread, a cost differential that likely deterred many storeowners from purchasing the former. Second, storeowners would often confuse the two types of 'wheat' bread offered at the wholesaler (split top, 100% whole) and carry the less expensive split top in their stores during the intervention. In regards to frozen vegetables, only premium brand items (i.e., Hanover, Bird's Eye) were included in the impact analysis. Process evaluation results (unpublished data) indicated that those storeowners that stocked frozen vegetables chose to stock private label brands because of their lower cost. Thus, if sales of private label frozen vegetables increased in intervention groups compared to control, the SIQ would not have tracked this change.

The sales of promoted items also increased in the combined pricing & communications group (G3). There was an increase in total sales of promoted items that did not reach statistical significance at conventional levels and a statistically significant increase in sales of Healthier Snacks. This is particularly important since high-fat and calorie snack foods are a common source of additional calories purchased by corner store customers in urban settings (Borradaile et al., 2009; Kiszko et al., 2015; Lent et al., 2014; Martins et al., 2012; Ruff, Akhund, & Adjoian, 2016), and substitution of these foods with healthier snacks (i.e., those promoted in this study) may provide the needed calorie deficit for weight loss. To our knowledge, no prior studies have evaluated the consumer purchasing effects of combined interventions on healthier snack foods in small stores (Ball et al., 2015; Bamberg, 2002; Bihan et al., 2012; Brimblecombe et al., 2013; Ni Mhurchu et al., 2010; Waterlander et al., 2013).

No statistically significant changes in sales were seen for the pricing only (G1) and communications only (G2) groups compared to control. Thus, while either pricing or communications interventions alone motivated storeowners to stock, combined approaches may have been necessary to result in increased sales. A combined strategy would mimic the mechanism of an actual trade promotion, as food suppliers generally include storage and marketing materials to support the sales of their promoted products (i.e., beverage coolers, point-of-sale displays, shelf talkers) (Poddar, Donthu & Parvatiyar, 2013). Marketing research has found that trade promotions, even when pass-through does not occur, leads to an increase in sales (Poddar & Donthu, 2011). Pertaining to this study, it is possible that storeowners in the pricing groups felt some residual obligation to actively promote the foods themselves in return to receiving a wholesaler discount. Additionally, the pricing storeowners may have been more motivated to push the sale of promoted foods since their profit margins on the promoted items increased as a result of the wholesale discount (e.g., displaying promoted items in more prominent areas, etc.). The increase in promoted food profit margins coupled with in-store communications appeared to provide the combined (G3) storeowners the necessary tools to increase healthier snack sales.

The two requirements of the store-directed performance-based allowance (PBA) were to stock the promoted foods and provide retail-pass through to their customers. The greatest changes in stocking of promoted foods were seen among the pricing groups (n=11), providing evidence that storeowners adhered, at least partially, to the first requirement of the PBA.

For the most part, however, storeowners did not adhere to the second requirement (retail price discount pass-through), with the exception of Phase 2 staple foods ($0.47 difference in price changes for Phase 2 foods in combined stores vs. control). Storeowners may have provided retail pass-through for Phase 2 foods because of their perishability (i.e., bread, frozen vegetables) and high baseline cost compared to beverages and snacks. We suggest several reasons why pricing intervention storeowners failed to consistently provide pass-through for the other foods. First, storeowners expressed concern over providing temporary price reductions because they believed they would result in customer complaints and distrust when prices were returned to normal levels. Storeowners expressed that their customers were extremely price-sensitive, down to the smallest monetary unit (Kim et al., under review). Second, the limited research on trade promotions shows that 30% of trade promotions go directly to the retailer's bottom line, and this may have been the case with our stores (Poddar & Donthu, 2011). Third, our staff had limited capacity to enforce the pass-through of the PBA because we did not have access to sales receipt data. Thus, there were no repercussions to the storeowner if pass-through did not occur, whereas in trade deals, the allowance is rescinded in the absence of the 'performance'.

Finally, there were no significant intervention effects on overall storeowner psychosocial factor scores compared to control, although treatment effects were found for phase-specific storeowner psychosocial factors. There was a statistically significant decrease in outcome expectations for sales of Phase 1 drinks for G1 and G2 stores compared to control. During the last month of the trial, a 5-cent bottle tax was passed in

Baltimore City, resulting in price increases of all bottled beverages at local wholesalers. Wholesale staff anecdotally commented that the bottle tax caused many storeowners to travel beyond the city limits to purchase food supplies (Budd N., unpublished data). Since intervention storeowners were obligated to purchase the promoted foods from the intervention wholesale stores, the 5-cent increase in price for each bottled beverage may have been enough of a price increase to cause a decrease in outcome expectations for these beverages, compared to control stores (who could shop at other sources beyond city limits).

There was a non-significant increase in store-owner intentions to sustain stocking of Phase 3 snacks in all intervention stores (G1, G2, G3) compared to control, which match the significant increases in stocking (and sales for G3 stores) of these foods. Conversely, there was a non-significant decrease in intentions to sustain stock of Phase 2 staple foods among G1 and G2 storeowners compared to control, which was not surprising, considering that the stock and sales of these items did not increase during the intervention period.

Limitations

There were some limitations to this study. First, we relied on storeowner recall to obtain sales data. Prior store-based trials have reported the complexity in obtaining sales receipt information from small independent stores and this study was without exception (Dannefer, Williams, Baronberg, & Silver, 2012; Song et al., 2009). To minimize the potential for reporting bias, pre-tested, standardized instruments were used (Song et al., 2009), and data collectors were extensively trained and standardized

in their delivery. Second, post-intervention data collection was delayed substantially (i.e., ~3 months) following the trial's end date, so that storeowners were not receiving any interventions at the time of collection. However, the delay likely muted intervention effects and provides evidence for sustainability at 3-month follow-up. Third, stocking and sales data on some promoted foods (i.e., fresh mixed fruit, grapes, cut melons, private-label brands of frozen vegetables) were excluded from the analyses because they were not collected at baseline. However, this likely led to more conservative results or an underestimation of intervention effects. Fourth, we were unable to collect data on the stocking and sales of unhealthier comparative foods (i.e., regular potato chips, cookies, regular sodas). Research on the effects of healthier food discounts on *total* calories purchased and consumed is mixed; but may lead to weight gain if substitution across products does not occur (Chandon & Wansink, 2012; Powell et al., 2013). Finally, the generalizability of study results may be limited to low-income, urban, predominantly black neighborhoods and stores. However, given the disproportionate burden of obesity and chronic disease placed on these subgroups, targeted interventions may be the most appropriate course of action.

7.5.1. Conclusions

The Consumer-Packaged Goods (CPG) sector spends approximately $75 billion per year on trade promotions, compared to advertising expenditures of $37 billion (Poddar & Donthu, 2011). Despite industry spending more on trade promotions than on any other marketing activity, academic researchers lack understanding about trade promotions and the potential they hold to shift consumer preference (Poddar &

Donthu, 2011; Gomez et al., 2007). Food access interventions must strive to create supportive environments for storeowners so that they feel confident that they can stock and sell healthier food items without negatively impacting their bottom line. Experimental research in real settings is needed to understand the mechanism by which trade promotions can increase healthy food supply and demand in small stores. Future efforts with stores should utilize scanner systems in order to examine own- and cross-price effects of trade promotions in these settings. Collaboration with vendors and major snack suppliers in these areas may reduce bottlenecks to healthier food access, and enhance efficiency, as they have the infrastructure and materials to run trade promotions on their healthier product lines. Lastly, different types of trade promotions should be tested (i.e., slotting allowances, movement allowances, etc.) to determine which are most effective and feasible in small store settings. In a time of corporate self-regulation, incorporating trade promotions to increase healthy food access and demand has the potential to be a win-win for business owners' bottom lines and public health alike.

List of abbreviations

BHRR: B'More Healthy Retail Rewards; SIQ: Store Impact Questionnaire; PBA: Performance-based allowance; CPG: Consumer packaged goods

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Table 7.1. BHRR intervention components & phases

Phase	Weeks	Objectives	In-store communications examples (12 stores)					Wholesale Discounts (12 stores)
			Interactive Displays & Taste Tests	Educational Handouts	Posters	Shelf labels & talkers	Giveaways	
1: Better Beverages	10 Feb-April 2013	(1) Lower calorie drink alternatives (2) Replace soda with water (3) Switch to low-fat milk	'Rethink your drink!' Blind taste tests of popular drinks and lower sugar/fat alternatives	'How does your drink measure up?'	"Replace one bottle of XX with water each day to lose XX lbs per year!"	"Refresh!" "Re-energize!" "Refuel!"	Drink tumblers with BHRR logo	Deer Park Water – 25% Pepsi Next – 20% Coke Zero – 20% Rutter's 1% Milk – 20%
2: Healthier Essentials	8 Apr-June 2013	(1)Replace white bread with whole wheat (2) Use frozen vegetables to increase vegetable intake (3) Switch to tuna in water for a healthy lunch alternative	Banana-apple-whole wheat bread pudding samples & recipes No-mayo tuna salad samples & recipes	'What's the difference between whole and refined grains?'	"The Value of Frozen Vegetables" (pick some up at your local corner store!)	"Fiber-rich!" "Wholey Delicious!" "Protein-Packed!"	Re-usable cloth grocery bags with BHRR logo	Essential Everyday frozen vegetables (all types) – 10% Hanover & Bird's Eye frozen vegetables (all types) – 20% 100% whole wheat bread – 20% Starkist & Bumblebee chunk light tuna – 10% Starkist & Bumblebee white albacore tuna – 20%
3: Low-fat Snacks	8 June-Aug 2013	(1) Replace sweets with lower sugar/calorie alternatives (2) Try baked potato chips instead of fried (3) Have fresh fruit for a healthy snack	'What's in your snack?' Baked chip taste test Fruit salad samples	'Easy and Quick Snacks 150 calories or less!'	'Fresh Fruit Sold Here!' 'Have a Snack Attack without the Fat!'	"Low-fat Snack Attack!" "Baked is Better!"	Produce refrigerator or freezer with BHRR logo (store-level) Baked Chip Clips with BHRR logo (consumer)	Utz Baked potato chips – 30% Quaker Oats 90 calorie granola bars – 15% Fresh fruit (apples, oranges, bananas) – 20%

Table 7.2. Baseline store and storeowner characteristics per treatment group

Characteristic	Pricing Only (n=6)	Comm. Only (n=6)	Combined (n=6)	Control (n=6)
Gender[a] Male	6(100%)	5(83%)	5(83%)	6(100%)
Storeowner race[a]				
Asian	5(83%)	4(67%)	4(67%)	4(67%)
African American	1(17%)	2(33%)	1(17%)	1(17%)
White	0	0	1(17%)	1(17%)
Storeowner ethnicity[a]				
Hispanic/Latino	0	1(17%)	1(17%)	1(17%)
Storeowner characteristics				
Storeowner is the primary food shopper for the store[a]	5(83%)	5(83%)	4(67%)	6(100%)
Number of times storeowner shopped for their store in the past 30 days[b]	33.6±15.5	43.9±13.2	44±21.8	38.7±6.6
Number of times storeowner shopped at BGreen in the past 30 days[b]	17.8±9.4	25±8.4	15.8±12.8	21±9.1
Number of employees (incl. family members, excluding owner)[b]	2.5±1.8	2.2±0.8	3.8±2.3	2.3±1.9
Number of years in business[b]	11.1±9.9	8.1±5.1	4.2±2.9	14.5±8.4
Store characteristics				
WIC-approved[a]	3(50%)	2(33%)	4(67%)	2(33%)
Accepts SNAP[a]	6(100%)	6(100%)	5(83%)	5(83%)
Sells alcohol[a]	1(17%)	2(33%)	0	0
Sells tobacco products[a]	6(100%)	6(100%)	6(100%)	6(100%)
Checkout counter enclosed in Plexiglass[a]	6(100%)	6(100%)	4(67%)	5(83%)
Behind-the-glass[a]	2(33%)	2(33%)	1(17%)	1(17%)
Average # of different customers per day[b]	147±85	154±103	145.5±145	196±87
Number of beverage coolers[b]	2.8±0.8	4.3±2.9	3.3±1.4	3.7±1.4
Number of additional refrigerators (incl deli cases)[b]	1.5±1.2	1.2±0.4	1±1.1	1.3±0.5
Number of functional freezers[b]	3±1.1	2.7±1.0	2.8±0.4	3.1±0.8
Frequency of food/beverage deliveries in the past 30 days[b]	16.7±10.5	10.7±8.8	15.7±12.7	21.5±11.3

No significant differences found between treatment groups (p>0.05)
[a]Fisher's exact test (for expected frequencies of <5) for dichotomous outcomes
[b] Mean±SD reported using one-way ANOVA for continuous outcomes (for interpretation). Differences between groups determined using Kruskal-Wallis tests.

Table 7.3. Treatment effects for intervention groups compared to control

Measures	Pricing only			Communications only			Combined Pricing and Communications			Control	
	Baseline scores	Change from baseline	Diff. in Diff.[a]	Baseline scores	Change from baseline	Diff. in Diff.[a]	Baseline scores	Change from baseline	Diff. in Diff.[a]	Baseline scores	Change from baseline
Stocking score											
Phase 1 foods[b]	1.2±0.4	0.4	**0.8***	1.2±0.8	1.0	**1.3*****	1.7±0.8	1.0	**1.3***	1.5±0.5	-0.3
Phase 2 foods	1.7±1.0	0.5	0.7	1.5±1.0	-0.8	-0.7	1.8±1.2	1.0	0.8	1.5±0.5	-0.2
Phase 3 foods	1.3±1.5	1.7	**2.2*****	1.0±1.1	1.3	**1.8****	2.2±1.5	0.8	**1.3****	1.2±0.8	-0.5
All foods combined	4.16±2.3	2.6	**3.6****	3.7±1.6	1.5	**2.5****	5.7±2.3	2.5	**3.5***	4.2±1.6	-1.0
Sales (units)											
Phase 1 foods	15.7±12.9	5.1	3.3	22.7±29.3	-8.9	-10.7	10.0±5.0	7.7	5.9	14.6±10.3	1.8
Phase 2 foods	8.3±12.1	-6.1	-5.6	1.4±2.1	-0.9	-0.3	4.3±4.2	-1.1	-0.6	2.5±2.9	-0.6
Phase 3 foods	10.6±18.8	-0.9	3.6	5.7±8.0	-1.5	2.9	12.9±13.9	2.0	**6.4***	9.6±8.7	-4.4
All foods combined	34.5±31.8	-2.0	1.2	29.8±29.2	-11.3	-8.1	27.2±18.3	8.6	11.8	26.6±13.1	-3.2
Promoted food prices[†] ($)											
Phase 1 foods[c]	7.14±2.22	0.00	0.00	7.76±5.38	-0.55	-0.55	8.30±5.41	0.16	0.16	4.18±3.54	0.00
Phase 2 foods	7.64±3.33	0.16	0.09	4.27±2.53	0.02	-0.04	7.77±5.48	-0.40	**-0.47***	4.56±3.06	0.07
Phase 3 foods	1.76±0.82	0.15	0.14	1.23±1.16	0.17	0.16	2.46±1.61	0.02	0.01	1.63±2.21	0.01
All foods combined	16.55±2.12	0.31	0.24	13.26±8.57	-0.35	-0.43	18.52±11.72	-0.22	-0.30	10.38±6.50	0.08

[a] Unless otherwise noted, treatment effect estimates were derived from difference-in-difference analyses using linear generalized estimating equations with independent correlation structure and robust standard errors (change in intervention scores from baseline – change in control scores from baseline)

*p≤0.05

**p≤0.01

***p≤0.001

[b] exchangeable correlation structure used

[c] unstructured correlation structure used

[†] Baseline scores indicate the pooled prices of foods per phase of those foods that were stocked. If a food was not stocked at either time point, the price was given a value of 0 for both pre- and post-measurements so total change (Δ) was 0 for these foods.

CHAPTER 8. CONCLUSIONS

The final chapter summarizes the main findings in relation to thesis study aims, discusses the strengths and limitations of the thesis, and discusses implications for future research, methodologies, and practice.

8.1 SUMMARY OF MAIN FINDINGS

The goal of this thesis study was to implement and evaluate a multi-level communications and pricing intervention with small stores and wholesalers in order to improve access to and consumption of healthier foods for low-income residents of Baltimore City. Specifically, I examined the effectiveness of store-directed pricing incentives, with and without communications, on wholesale-level stock, and store-level stock and sales of promoted foods. This section summarizes findings as they relate to thesis study aims.

Research Aim 1: *To describe the study design of B'More Healthy Retail Rewards and to introduce an industry-driven pricing approach in a public health setting.*

Aim 1 was the first of three journal papers, and presented a review of the BHRR study design, development, and implementation, as well as the rationale for an innovative pricing strategy. This study protocol paper was published in *BMC Public Health (2015)*. As a protocol paper, there were no data analyses or results. Instead, the purpose of this paper was to describe the study design of BHRR and to introduce a store-directed pricing strategy not previously employed to increase healthy food access

and improve food behaviors. Fiscal policies to curb the obesity epidemic show promise, however, the dominance of the food industry has prevented 'sin' taxes from becoming a reality and nationwide subsidization of fresh foods will be costly. As such, it may be several years before federal nutrition regulations support healthier diets. Using performance-based allowances to shift consumer food behaviors provides the food industry a mechanism by which to contribute to obesity reduction efforts without government intervention, while supporting corporate bottom lines. Additionally, roll-out of industry-led initiatives would be faster to implement than policy-driven strategies, and can be a part of current self-regulatory efforts (i.e., Healthy Weight Commitment Foundation). BHRR was the first study to test the application and feasibility of using trade allowances (i.e., performance-based price reductions) to increase the supply and demand of healthier foods at consumer-, store-, and wholesale-levels. This was also the first pricing and communications trial in small food stores, and the first trial to intervene in food wholesale stores.

Research Aim 2: *To evaluate the implementation of the wholesale-level pricing and communications intervention through process evaluation.*

Research question: How well and to what extent the wholesale intervention was implemented in terms of reach, dose delivered/received, and fidelity?

Based on process evaluation results, the wholesale-level program was implemented with high indirect reach, dose delivered (communications), and stocking fidelity, and moderate dose received (storeowner exposure) and pricing fidelity.

Inclusion of food wholesalers in food access interventions is feasible and can lead to immediate improvement in the supply of healthier foods. The most difficult intervention component to implement was the application of price discounts to specific wholesale customers (12 price storeowners), which negatively affected pricing fidelity. Researchers seeking to work with food industry (i.e., storeowners, food wholesalers) should be cognizant of time and resource limitations and make provisions, when possible. For example, contracting an outside IT programmer may have minimized the delay in programming EPOS discounts to pricing storeowners. Additionally, inexpensive point of sale software is now available for small food retailers, farmer's market vendors, food trucks, and carry-outs. Assisting storeowners to transition to these systems would improve researchers' data collection methodologies, while minimizing time-burden attributed with storeowner surveys.

Research Aim 3: *To examine the effects of performance-based monetary incentives (10-30% discount) and communications strategies, separately and combined, on store stock, prices, and sales of promoted healthful foods, and on related storeowner psychosocial variables.*

Hypothesis 1: Intervention stores/owners (n=18) would demonstrate significantly greater change in promoted food stocking, sales, and psychosocial factor scores compared to control stores from baseline to post-intervention.

Hypothesis 2: Combined intervention stores (n=6) would see the greatest change compared to single intervention stores and control from baseline to post-intervention.

As hypothesized, pricing only, communications only, and combined stores saw a 3.6, 2.5, and 3.5 unit score increase in stocking of promoted food types, respectively, compared to control. This finding was consistent with a systematic review by Gittelsohn et al (2012) that found that overall availability of promoted foods increased in all 16 of the small food store trials examined. In terms of stocking of promoted foods, both pricing discount groups were associated with a larger effect than the communication's group, though post-hoc tests did not find a statistically significant difference in magnitude between the three intervention types. When broken down by food phase or type, changes in food stocking for intervention groups versus control were seen for beverages (Phase 1) and snacks (Phase 2), but not for promoted staple foods (Phase 2). These findings may indicate that storeowners perceive low demand for staple foods such as frozen vegetables, whole wheat bread, and canned tuna, in convenience-type corner stores. Alternatively, the price point of staple foods that were promoted may have been too high for storeowners to stock, even among those in the pricing groups. Future interventions should aim to overcome barriers to increasing the availability of healthy household foods, such as identifying lower cost suppliers and better private label brands for small food stores.

There was a significant positive intervention effect of the combined pricing & communications intervention on promoted snack sales (Phase 3 products), observed as an increase of 6.4 units sold per day, versus control. This change was observed three months after wholesale- and store-level price and communications interventions had ended, providing evidence that program effects were sustained. Sales of total promoted

foods in both pricing groups increased from baseline to intervention compared to the control group, while sales of total promoted foods in the communications only group decreased compared to control, but changes were not significant. Our results parallel the findings of the seven published store-based pricing trials that demonstrated that all pricing arms were effective in increasing healthy food purchases, but that other non-price strategies (i.e., behavioral, health communications) were effective in only 2 of the 5 trials that tested adjunct treatments (Ball et al., 2015; Bamberg, 2002; Bihan et al., 2012; Brimblecombe et al., 2013; Ni Mhurchu et al., 2010; Waterlander et al., 2013). Furthermore, only one of the four factorial pricing and communication/education trials found that combined effects were greater than pricing alone (Ball et al., 2015; Bamberg, 2002; Ni Mhurchu et al., 2010; Waterlander et al., 2013). While we found no significant differences between pricing only, communications only, and combined (versus control) for the increase in healthy food stocking; we found significant increases in the combined group only with respect to sales of healthy snacks. This finding infers additional communications strategies may be helpful to push the sales of healthier foods. Since none of the other food store pricing studies have intervened in urban small food stores, more trials, with a larger sample of corner stores, are needed to confirm this hypothesis.

There were no statistically significant changes from baseline to post-intervention in overall storeowner psychosocial factor scores (self-efficacy and intentions to stock, outcome expectations to sell and on overall program impact) for intervention groups versus control. These results were contrary to our hypothesis, however, not surprising given findings from prior Baltimore store-based trials, which also found no significant

changes between intervention and comparison storeowners (Song et al., 2009) There were significant decreases in outcome expectations for pricing only and communications only stores compared to control for healthy beverages, which may be a direct reaction to the 5-cent per bottle tax that was passed on all bottled beverages sold/purchased within the city. Since intervention storeowners were obligated to purchase the promoted foods from the intervention wholesale stores, the tax may have caused the decrease in outcome expectations for these beverages, compared to control stores (who could shop at other sources beyond city limits). There was also a non-significant increase in store-owner intentions to sustain stocking of Phase 3 snacks in all intervention stores (pricing only, communications only, combined) compared to control, which match the significant increases in stocking (and sales for combined stores) of these foods. As with the other 10-month long Baltimore store-based trial, trials of longer duration may be necessary to see greater impact on storeowner psychosocial factors. It is likely that only after storeowners notice an increase in healthy food sales that their outcome expectations, self-efficacy, and intentions to stock and sell healthier foods increase as well.

Research question (secondary): Did storeowners in the pricing intervention comply with the agreements of the performance-based allowance (stocking the item and retail pass-through)?

The two requirements of the store-directed PBA were to stock the promoted foods and provide retail-pass through to their customers. The greatest changes in stocking of promoted foods were seen among the pricing groups, providing evidence

that storeowners adhered to the first requirement. However, there were no significant intervention effects on total promoted food prices compared to the control group, demonstrating that retailers did not pass on the discount to their customers. The combined pricing and communications storeowners did pass on discounts by way of a $0.47 decrease on healthier staple foods (versus control). Storeowners may have provided retail pass-through for Phase 2 foods because of their perishability (and the need to sell items faster) and high baseline cost compared to beverages and snacks. In Chapter 6, we discussed several reasons why pricing intervention storeowners failed to consistently provide pass-through for the other foods. The price sensitivity of small food store customers and our staff's limited ability to enforce the pass-through likely contributed to the lack of adherence. Future research should engage 'actual' beverage and snack vendors (in lieu of research staff who monitored stores) who would have the capacity to offer performance allowances on their products, as well as a way to enforce them.

In comparing process (Chapter 6) and impact analyses (Chapter 7), an important discovery was made. Phase 3 snack food discounts were not applied to pricing-only or combined storeowners, as was intended during the 5th and 6th months of the intervention. Interestingly, both pricing intervention groups (n=12) significantly increased stock of healthy snack foods and the combined intervention group also significantly increased *consumer* sales of Phase 3 snack foods. Thus, even though prices of snack foods were not reduced at the store OR wholesale-level, the pricing interventions were successful in increasing stocking and sales of healthy snack foods. I

propose a few reasons why this may have occurred. First, the storeowners likely believed that they were receiving discounts on snacks, because they already had been receiving discounts on the other promoted foods and beverages for four months. Research staff members were not told (by the wholesaler) that discounts were not applied on promoted snacks until post-intervention. Therefore, interventionists behaved as though pricing discounts were applied. Additionally, discounted prices were not posted on promoted food items, but were applied at the cash register at the time of purchase. In post-intervention interviews, only 36% of pricing storeowners reported 'noticing the discount', indicating that most did not consistently check receipts. However, believing that they were receiving them, with or without communications, may have been enough to encourage or 'nudge' storeowners to stock new and healthier snacks.

Second, one of the objectives of trade promotions is to build the vendor-retailer relationship (Poddar et al., 2013). Supermarket retailers receive so many trade promotions that they must choose those that enable them to make the most profits (Poddar et al., 2013). However, aside from receipt of beverage coolers to stock specific name brand soft drinks, small storeowners receive few trade incentives from their suppliers. Small incentives from our wholesaler, such as those given in this study, may have been enough to enhance storeowner loyalty, so that they agreed to purchase and stock the promoted foods. More research on the effects of trade promotions on small food store stock and sales of healthier foods is needed and is discussed in further detail in Section 8.3.

8.2. STRENGTHS AND LIMITATIONS

Strengths

As mentioned previously, the thesis study was a novel trial with many 'firsts' – the first pricing and communications trial in small food stores, the first trial to intervene in food wholesale stores, and the first study to test the application and feasibility of using trade allowances. It is also important to acknowledge that intervention feasibility and impact were tested in low-income settings, where healthy food access initiatives are needed most. Additionally, this study was conducted in a real-world setting, compared to most research on trade promotions that has been conducted using simulations or modeling (Poddar & Donthu, 2011).

This study was methodologically rigorous. One year of formative work with wholesalers and storeowners strengthened intervention development and implementation, and will be reported on in future publications (Kim et al., in preparation). Promoted food selections, communications materials, and price discounts/applications were identified and refined. Interviews with storeowners were conducted to gain understanding of stocking decisions and barriers and facilitators to stocking and selling healthy foods. Several meetings with the CEO of the wholesaler and other executives were conducted to make adjustments, when necessary. Formative research also allowed the time to build rapport, which was strong with most of the storeowners and the wholesaler staff.

The factorial design is a strength, as it allowed this study to show the effect of price changes, separately and in combination with, health communications. In a review

by Epstein et al (2012), the authors remarked that "additive or interactive effects with non-price manipulations could have an important impact on public health, even if the price changes alone were too small to have a significant benefit." As our results suggest, combined approaches may be more effective than price strategies alone to increase the sales of healthier snacks.

Because our storeowners sample was small, time-invariant differences between intervention groups were likely. Therefore, two methodologies were employed to strengthen the study design. First, stores were stratified by WIC status and daily sales volume to ensure comparison of treatment groups with similar characteristics. Second, even though I found no statistically significant differences in baseline characteristics according to intervention group, I suspected there was limited power to detect differences. Therefore, difference-in-difference estimators were used to guard against baseline differences confounding treatment effects.

A final strength of the thesis study is that it is nested within a large, multilevel trial (BHRR) that examines impact and process evaluation at the consumer-level and evaluates store-level outcome variables longitudinally. Further analysis can corroborate, support, or challenge thesis study findings. For example, process evaluation of store-level intervention components can provide additional insight on the successes and failures of intervention implementation. Repeated measures analyses at the store-level can identify patterns in stocking and sales of promoted foods during specific periods of time. For example, staple foods may have increased during phase 2, and then dropped off at the end of intervention period (4 months later), and longitudinal analyses will be

able to capture these changes. Process evaluation of store-level components and impact evaluation with consumers can also provide insight to strengthen and improve multilevel communications and/or pricing programs in the future.

Limitations

This study had some limitations. First, in terms of intervention implementation, phase 3 foods were not discounted at the wholesale-level. However, this unplanned finding provides insight to the mechanisms of trade promotions and the importance of cultivating supplier-customer relationships, which should be further explored in real settings similar to this study.

We relied on storeowner recall to obtain store-level sales data, since storeowners were either not willing to disclose financial data or did not have the equipment to do so. Prior store-based trials have reported the complexity in obtaining sales receipt information (Song et al., 2009; Dannefer et al., 2012). To minimize the potential for reporting bias, pre-tested, standardized instruments were used, and data collectors were extensively trained in their delivery. Furthermore, sales recall data was cross-checked with stocking data (for all promoted foods) and wholesaler sales records (for beverages and staple foods).

Sales data that was provided from the wholesaler were missing estimates for Phase 3 snack foods. Therefore, we could not provide process or purchase data for Phase 3 snack foods. The wholesaler also did not provide pre- or post-intervention sales data on promoted foods so that we could discern the change in sales of promoted foods over time. Even though we were able to capture store-level stocking of promoted

foods, which should have mirrored wholesale-level sales, storeowners still may have purchased some of the promoted foods at other suppliers. Obtaining wholesale-level movement data should be an important objective for future intervention programs that evaluate impact.

The thesis study was not able to predict within-category shifts in purchasing between healthier and less healthy alternatives. Therefore, we were not able to see substitution effects due to the pricing reductions and communications promotions. Research on the effects of healthier food discounts on total calories purchased and consumed is mixed; but may lead to weight gain if substitution across products does not occur (Powell et al., 2013; Chandon & Wansink, 2012). Future intervention should focus additionally on the decreased purchase and consumption of unhealthier foods, while promoting healthier substitutes.

The wholesaler and small store sample may have been biased because those who agreed to participate did so because they were interested in the topic. Sampling or non-response bias may limit the generalizability of the thesis study if only interested storeowners participate. To mitigate this potential limitation, efforts to create a heterogeneous sample had been made by selecting stores from both East and West sectors of the city, trying to obtain a mix of Korean Americans and other ethnicities, behind-the-glass stores and walk-in stores, and stores that participated in WIC and those that did not.

Finally, the generalizability of study results may be limited to low-income, urban, predominantly black neighborhoods and stores. However, given the disproportionate

burden of obesity and chronic disease placed on these subgroups, targeted research and interventions may be the most appropriate course of action to reduce health inequities. It is likely that results and lessons learned from this study can be transferable, at least in part, to other low-income urban store-settings throughout the U.S.

8.3. IMPLICATIONS FOR FUTURE RESEARCH, METHODOLOGY, AND PRACTICE

New systems-oriented approaches to obesity prevention have called for the incorporation of food wholesalers, distributors, and manufacturers (Anderson-Steeves et al., 2014). This study is the first to actively involve food wholesalers in a food access intervention, but we barely have begun to understand the mechanisms by which suppliers can support healthy food supply and demand, and also satisfy corporate objectives. Future field research and practice in this area should consider the following:

Choose comparable and healthier substitutes

Interventions should not focus solely on fruits and vegetables, but incorporate healthier alternatives to packaged snacks and beverages (i.e., chips, soft drinks), which are the most popular and profitable food items to small retailers in these settings (Paper 3; Andreyeva et al., 2011). Discounts or subsidies on fresh fruits and vegetables may not necessarily lead to replacement of unhealthier snacks and beverages. In a 2014 systematic review on the effectiveness of food taxes and subsidies, Thow et al reported that studies that subsidized fruits and vegetables found an increase in consumption of the target foods, but also saw an increase in overall food consumption or total caloric intake (Thow et al., 2014). Individuals that regularly consume packaged foods such as chips, cookies, and soda, may not necessarily replace them with fruits and vegetables,

but perhaps they will substitute them with lower-calorie baked chips and beverages. Consumer packaged goods (CPG) account for almost two-thirds of the calories (Ng, Slining, et al., 2014). Substitution of 'better for you' foods could lead to calorie deficits over time. Healthier substitutes should be comparable and less expensive to encourage substitution of unhealthy foods with targeted healthy food (Hawkes et al., 2015). In our trial, some of the promoted discounted foods had less expensive unhealthy alternatives, as was the case with chips (baked vs. regular), bread (whole wheat vs. white/split-top), and granola bars (low-calorie vs. high). To achieve substitution, it will likely be necessary to gain the cooperation of snack and beverage manufacturers to secure price-competitive healthier products packaged for small retail stores in low-income markets.

Use scanner data to capture own and cross-price effects

Own and cross-price effects of monetary discounts on healthier foods in small stores has not been assessed. Small stores are unique food sources in that there are more limited offerings than grocery stores but often more choices than some closed economy settings such as movie theaters, schools, and vending machines. Substitution provides the mechanism by which trade promotions or subsidies can be utilized to encourage healthy diets (Thow et al., 2014). However, too significant of a discount may encourage individuals to buy both products, resulting in the unintended consequence of an overall increase in dietary calories (An, 2013). It is also difficult to predict the price sensitivity of customers in these settings. Research suggests that low-income and obese customers are generally more price-sensitive (Powell & Chaloupka, 2009). However, consumers may be less sensitive to higher food prices at a small store where alternative

food choices and food sources are limited. To this point, experimental field studies, and specifically corner store interventions that can provide scanner sales data to capture own-price and cross-price effects, are needed in order to better predict consumer behavior and evaluate the effectiveness of price discounts.

Let storeowners choose healthier food options

The storeowner knows best the food preferences of his or her particular customers, and this may vary from store to store (and from neighborhood to neighborhood). Allowing the storeowner to choose from a list of available options, instead of providing a set list of foods, will give storeowners more control and strengthen stocking and sales outcomes. For example, even though focus group consumers expressed a desire for premium brand frozen vegetables in small stores, the discounted price was too high for storeowners to try stocking them. Providing a wider range of options (e.g., several brands, sizes, and types of frozen vegetables) would have allowed the owner to choose the items that would not create financial risk or loss. Choice may also foster more commitment by storeowners to properly manage and control store-level functions. This lesson learned has been implemented in a large system-oriented obesity prevention trial called B'More Healthy Communities for Kids (BHCK) and storeowners now are asked to choose from a list of possible options available at the wholesaler.

Provide health communications support to local food wholesalers

The BHRR trial provided limited communications at the wholesale-level because of the necessity to avoid cross-contamination of storeowner treatment groups (i.e.,

pricing only, control). However, food wholesalers interact with storeowners frequently (i.e., daily or weekly), deliver products to stores, and may employ a sales team to provide some level of marketing and store-level sales support. Two of the small stores in our sample received weekly deliveries from the participating wholesaler, and do not shop in person. Other small stores that received deliveries may have been unaware of the healthy choices that were available. Future intervention programs with wholesalers should enhance health communications for the delivery-side, including the development of order forms for healthy foods or mailed circulars that highlight healthier items (Shop Healthy NYC!, 2013). Similarly, SMS text messages could be developed and employed to provide wholesale members (i.e., storeowners, carry-outs) information on healthier wholesale options, such as new items, weekly deals, and tips on selling or displaying healthier foods.

Conduct targeted formative research with suppliers

Open-ended qualitative interviews may not the best methodology to obtain information from food suppliers, who work within tight deadlines. First, interviews need to be shorter and more focused. Second, formative work should additionally target, 1) the 'buyers', who work for the wholesaler and conduct all of the wholesale to distributor (or manufacturer) trade and pricing negotiations, 2) higher-level distributors (i.e., SuperValu, Sysco), who function as an intermediary between food manufacturers and wholesalers, 3) 'jobbers', or informal distributors that sometimes exist in urban food networks and who deliver foods in smaller quantities to independent retailers ('Healthy Food Supply in Small Stores', 2015) , and 4) food brokers or independent sales

people that sell products for multiple manufacturers in place of (or in addition to) the manufacturers in-house sales team. Formative work should seek to understand how higher-level suppliers can spur healthier local food supply and preferences, barriers and facilitators to doing so, how intervention programs can be strengthened from the supply-side perspective, and how these improvements can be put in practice.

Incorporate vendors, brokers, and manufacturers

Small stores receive frequent deliveries from snack and beverage vendors, making it easy for retailers to stock those items (Andreyeva et al., 2011). Manufacturers, in addition to making and packaging products, have the primary marketing responsibility in the food supply chain. Brokers typically serve as the sales and marketing link between manufacturers and wholesalers, but also perform marketing activities such as in-store sampling, in-store display management, and work with wholesalers (i.e., buyers, wholesaler sales personnel) to add product expertise and sales "push" on behalf of the manufacturers they represent. As such, vendors, brokers, and manufacturers' direct sales personnel are important stakeholders to include in any future interventions of this kind. Having the added benefit of association with Johns Hopkins might be appealing to manufacturers and brokers because of the intrinsic PR value on a local and national scale.

Tests different types of trade promotions

There are many types of trade promotions used in the food industry ranging from simple price discounts to more elaborate consumer contests where winning prizes may or may not be based on purchases. How to know which promotions work best and

in what combinations and value requires extensive research. This thesis and other studies cited point to the relative effectiveness of price discounts in stocking and sales of healthy products, and serve as a starting point for further test and evaluation of promotional opportunities for ultimately lowering obesity and chronic disease in low income areas.

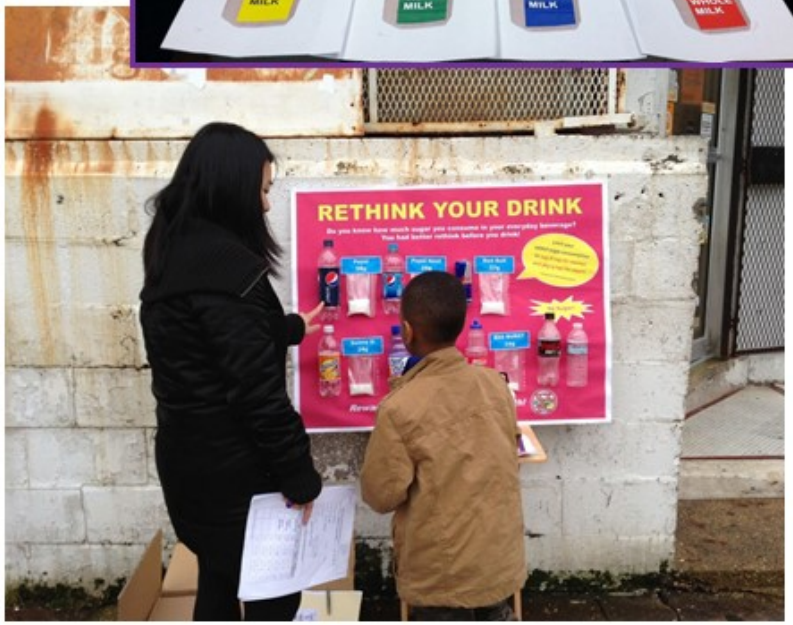
In particular, price discounts, free goods allowances, slotting allowances, performance allowances and volume discounts need to be studied further. Other forms of promotion used in the food business and therefore applicable to further research are display allowances, in-store sampling, and a range of contests designed to attract participation of store owners and consumers and can include marketing activities to promote awareness of healthy food initiatives. The use of marketing materials and product displays managed by beverage and snack suppliers with promotional funds they provide for performance seems specifically appropriate for Baltimore City.

APPENDICES A-E. SELECTED STORE INTERVENTION MATERIALS

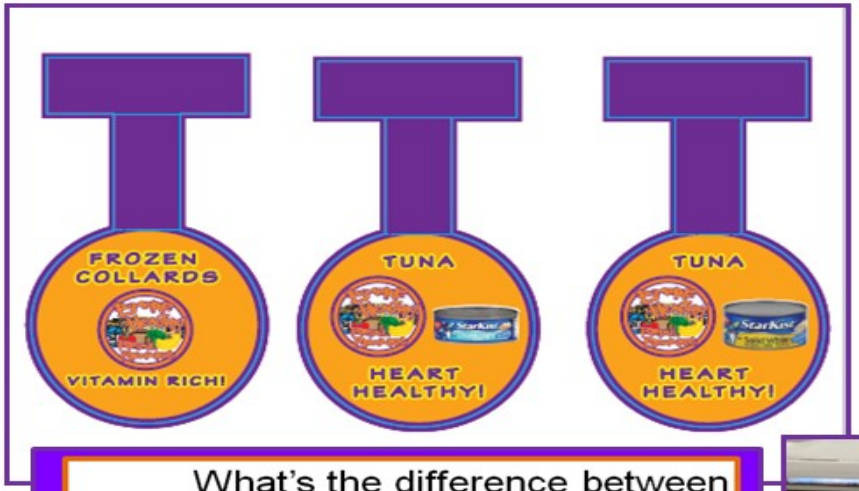
Appendix A. Pre-intervention 'Coming Soon' Door Signs

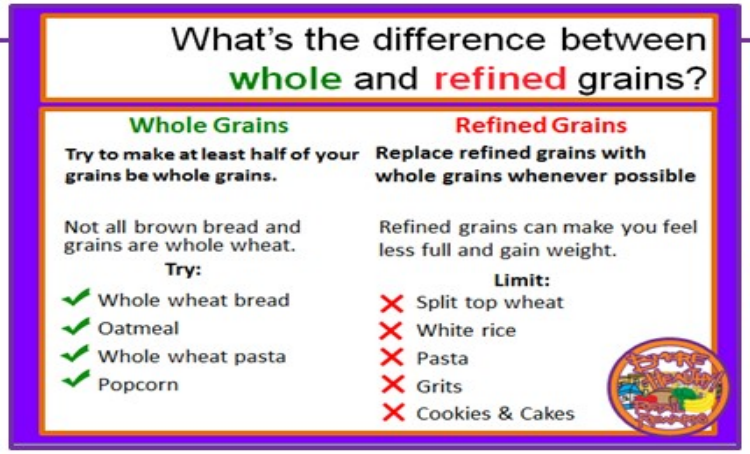
Appendix B-1. Phase 1 Shelf Talkers & Posters

Appendix B-2. Phase 1 Giveaways & Interactive Displays

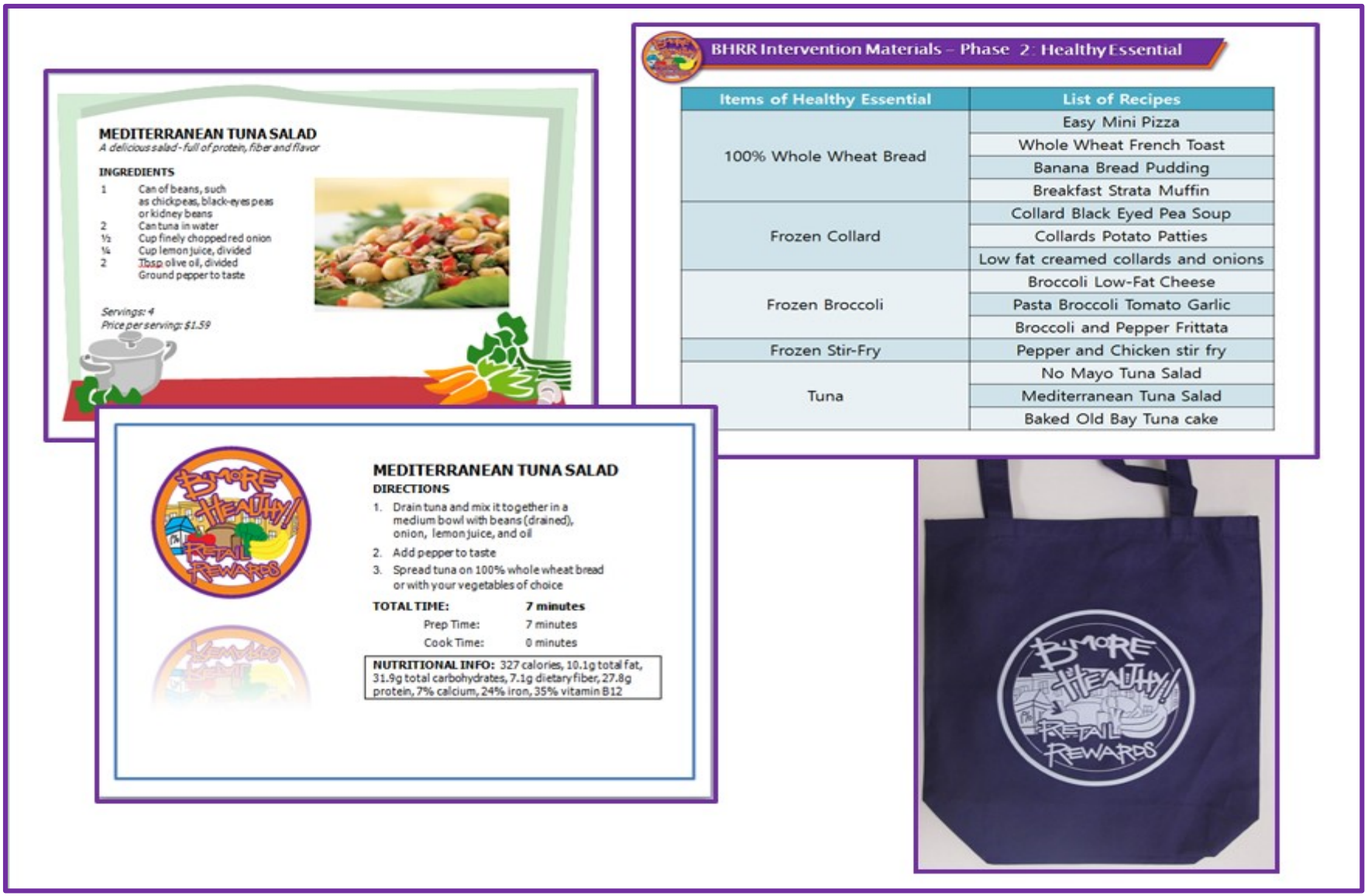


Appendix C-1. Phase 2 Shelf Talkers & Handouts





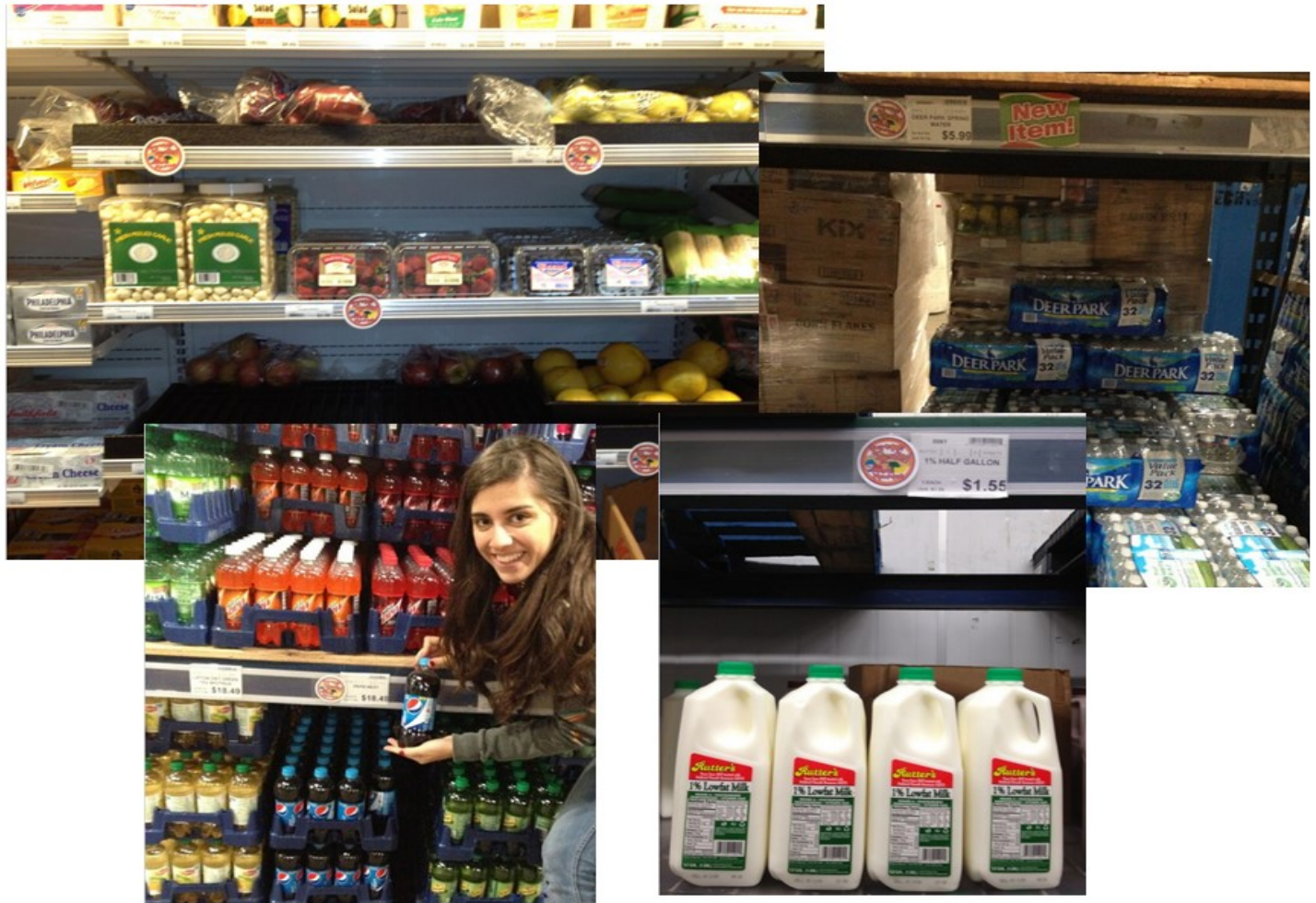
Appendix C-2. Phase 2 Recipe Cards, & Giveaways



Appendix D-1. Phase 3 Shelf Talkers, Posters, & Handouts

Appendix D-2. Phase 3 Giveaways & Interactive Displays

Appendix E-1. Storeowner directed communications (BHRR Logos at Wholesaler)



Appendix E-2. Storeowner directed communications (How-to-Manuals)

Front of pamphlet

Back of pamphlet

APPENDICES F-H. THESIS STUDY DATA COLLECTION INSTRUMENTS

Appendix F. Store Impact Questionnaire

Respondent ID:_____

Checked by_____
Date: ___/___/___

Entered by_____
Date: ___/___/___

Approved: December 5, 2012 **IRB No.**: 3430

B'More Healthy: Retail Rewards
Store Impact Questionnaire

Interviewer Name: _____ Date: _____/_____/_____ Day of the week:_____

Interview start time: _____ :____AM/PM

Resp. Name: _____ Store Name: _____

Store Address: _____

Phone Numbers: Home: _____

Store: _____ Cell: _____

Signed consent obtained?: Yes ☐ No ☐

Interview Checklist

"Before we begin, I want to give you some important information about this survey."

1. **This survey will take approximately 60 minutes. ___**
2. **Information collected will not be shared with anyone. __**
3. **There are no right or wrong answers. ___**
4. **If you need any of the questions or answer choices to be repeated, please ask me and I will be happy to help you. __**
5. **You can opt out of the survey at any time. ___**
6. **Thank you so much for your help. __**

"I am going to ask you about various aspects of your store that you feel may impact our program, your opinion about sales of healthy foods, how you think our program can improve the availability and sales of healthy foods, and your willingness to participate in our program."

Inclusion Criteria. Only conduct the interview if the respondent meets the following criteria:

1. Provides signed consent form
2. Is the primary operator (owner/manager) of the food store
3. Is at least 21 years of age
4. Will be available for follow-up

[NOTE: AFTER INSPECTION AND CHECKING OF FORM, REMOVE THIS TOP SHEET AND KEEP IN A SEPARATE LOCATION]

IRB #3430_Version 1_11-29-12 1

Respondent ID:_____

Section A: ABOUT YOUR BUSINESS

1. Store Classification

1.1. What is the designation (business code) on your food license application (e.g., 24 Grocery Store; 12 Carryout)?

_____

1.2. On your food license application, did you denote that you are a high, moderate, or low priority facility? _____

1.3. Does your store accept WIC?

Yes ..... ☐

No ..... ☐

1.4. Does your store accept SNAP?

Yes ..... ☐

No ..... ☐

1.5. Respondent Ethnicity: _____

1.6. How many years have you been operating this store? _____

1.7. How many years have you been operating food stores? _____

1.8. Normal days and hours of operation: _____

1.9. What is your store called by community members (in addition to official store name): _____

Respondent ID:_____

2. Customer and Worker Attributes

2.1. In general, about how many different customers do you have on an average day? _____

2.2. On a busy day? _____

2.3. How many of your customers are "regular customers" (visit once or more per week)? _____

2.4. Please rank the below in order of customers that shop at your store from most to least (i.e., most=1, least=4).

_____Adolescents (under 17)

_____Adult (18-35)

_____Middle-aged adults (36-60)

_____Older adults (60+)

2.5. "Most of my customers are…." Male ☐ Female ☐ Don't know/No difference ☐

2.6. How many non-family paid employees work at your store? _____

2.7. How many family members work at your store? _____

3. Food Acquisition and Promotions *(Use Appendix A for 3.2., 3.4., 3.6)*

3.1. Which food and beverages (or categories) do you **sell the most** (units) of**?**

List:_____

_____

Respondent ID:_____

3.2. Would you categorize any of below as **top sellers**? Check box if 'yes'. Write NONE if no items are top sellers.

1% Milk ☐	Pepsi Next ☐	100% Whole Wheat Bread ☐	Chunk Light Tuna in water ☐	Frozen stir-fry vegetables ☐	Apples ☐	Bananas ☐	Granola Bar, Quaker Oats 90 calorie, Assorted ☐
Bottled Water ☐	Coke Zero ☐	Solid White Albacore Tuna in water ☐	Frozen collards ☐	Frozen broccoli ☐	Oranges ☐	Reduced Fat Doritos ☐	Utz Baked Chips ☐

3.3. Which foods and beverages (or categories) have the **highest profit margin**?

List: _____

_____

3.4. Do you have the **highest profit margin** on any of the below items? Check box if 'yes'. Write NONE if no items have the highest profit margins.

1% Milk ☐	Pepsi Next ☐	100% Whole Wheat Bread ☐	Chunk Light Tuna in water ☐	Frozen stir-fry vegetables ☐	Apples ☐	Bananas ☐	Granola Bar, Quaker Oats 90 calorie, Assorted ☐
Bottled Water ☐	Coke Zero ☐	Solid White Albacore Tuna in water ☐	Frozen collards ☐	Frozen broccoli ☐	Oranges ☐	Reduced Fat Doritos ☐	Utz Baked Chips ☐

3.5. Which food and beverages (or categories) provide you the **highest gross profits**?

List:_____

_____

3.6. Would you categorize any of below as providing the **highest gross profits**? Check box if 'yes'. Write NONE if no items provide highest gross profits.

1% Milk ☐	Pepsi Next ☐	100% Whole Wheat Bread ☐	Chunk Light Tuna in water ☐	Frozen stir-fry vegetables ☐	Apples ☐	Bananas ☐	Granola Bar, Quaker Oats 90 calorie, Assorted ☐
Bottled Water ☐	Coke Zero ☐	Solid White Albacore Tuna in water ☐	Frozen collards ☐	Frozen broccoli ☐	Oranges ☐	Reduced Fat Doritos ☐	Utz Baked Chips ☐

Respondent ID:_____

3.7. In the past 6 months, what kind of promotions (free goods, displays, etc.) or monetary incentives have you received from your food/beverage suppliers to stock their product?

Name of supplier of product (e.g., B.Green, Utz, PepsiCo)	Name of product (e.g., Pepsi, Cool Ranch Doritos)	Product Displays		Monetary Incentives		Free Product		Other (List)
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	
		Yes ☐	No ☐	Yes ☐	No ☐	Yes ☐	No ☐	

Respondent ID:_____

3.8. In an average month, how many times do you (and/or your staff) shop for your store at the following (don't include personal/household shopping):

_____ B.Green Cash & Carry West (Monroe St) (BGW)

_____ B. Green Cash & Carry East (Belair Rd) (BGE)

_____ Jetro/Restaurant Depot (J)

_____ Maryland Cash & Carry (MD)

_____ Sam's Club (SC)

_____ Costco (C)

_____ Walmart (W)

_____ Supermarket List: _____

_____ Internet orders List: _____

_____ Other List: _____

_____

3.9. Which wholesalers/stores do you use most frequently? And how often do you (and/or your staff) shop there? (Write store name in column 1 and 2)

# of times	1st most frequent store	2nd most frequent store
Every day		
Several times a week		
Once a week		
Less than once a week		

Respondent ID:_____

3.10. In the past 30 days, what food or beverage suppliers (include food distributors) **delivered direct** to your store? This could be a wholesaler **or** a manufacturer that delivers. List below.

Name of Vendor	# of times in the last 30 days

Respondent ID:_____

3.11. Are you the primary food **buyer** for your store? Yes ☐ No ☐

3.12. Who does the **actual shopping** for your store? _____

3.13. How do you decide who does the **actual shopping** for your store?

_____

_____

3.14. What is the main factor(s) that influence where you (and/or your staff) buy the food for your store (e.g., location, price, time constraints, etc.)? Explain.

_____

_____

3.15. Are the stores where you (and/or your staff) shop for your store closer to your home or to your business?

Close to your home……..☐

Close to your store……☐

Other…… ☐ Explain: _____

Respondent ID:_____

4. Stocking and Sales of Promoted Foods

I am now going to ask you about stocking and sales of certain foods in your store. For each of the foods listed below, please (1) Tell me If you had the food in stock in the last 30 days (2) Estimate of the number of units (i.e. cans, packages) sold in the store **per day** in the last 30 days, from (date) to (today's date) (3) Give the current price of that unit and (4) List places you get that particular item. We just need your best guess. **Use Appendix A for the following sections.**

Food	Standard Unit	Current Price of Unit	Stocking status		Estimated # of units sold **per day** in the last 30 days	Bought food from what store(s) in the last 30 days? (*use abbrev. from 3.8)*
			In stock in the last 30 days? (Yes/No)	Has the item been continuously available during the last 30 days? (Yes/No)		
Phase 1: Healthy Beverages						
4.1.1 % Milk, Rutters	Half Gallon					
4.2. Bottled Water, Deer Park	16.9 fl oz. bottle					
4.3. Pepsi Next	1 bottle (24 fl oz)					
4.4. Coke Zero	1 bottle (24 fl oz)					
Phase 2: Healthy Essentials						
4.5. Solid White Albacore Tuna in water, Bumblebee	1 can (5 oz)					
4.6. Chunk Light Tuna in water, Bumblebee	1 can (5 oz)					
4.7. 100% Whole Wheat Bread, 'Schmidt Old Tyme'	1 Loaf					
4.8. Frozen Stir-Fry Vegetables, Bird's Eye	1 bag (12 oz)					
4.9. Frozen Collards, Bird's Eye	1 bag (12 oz)					
4.10. Frozen Broccoli, Bird's Eye	1 bag (12 oz)					
Phase 3: Healthy Snacks						
4.11. Apples, Gala	1 fruit					
4.12. Bananas	1 fruit					
4.13. Oranges, Navel	1 fruit					
4.14. Reduced Fat Doritos	1 oz bag					

Respondent ID:_____

4.15. Baked Potato Chips, Assorted Utz	1 oz bag					
4.16. Granola Bar, Quaker Oats 90 calorie, Assorted	1 bar					

4.17. Have the holidays influenced your **stocking** of any of the **promoted items** in the last 30 days? Yes ☐ No ☐

4.18. If yes, list which items and whether the **stocking** of each **promoted item** has increased or decreased.

_____

_____

4.19. Have the holidays influenced your **sales** of any of the **promoted items** in the last 30 days? Yes ☐ No ☐

4.20. If yes, list which items and whether the **sales** of each **promoted item** have increased or decreased.

_____

_____

4.21. Are there any healthier foods or beverages, excluding fresh fruits or vegetables, that you want to stock in your store but do not? Yes ☐ No ☐ *(If 'no', skip to 4.23.)*

4.22. If you answered "Yes", what are those foods/beverages? _____

4.23. What are the top 3 reasons, in order of importance, that you do not stock more healthy foods (excluding fresh fruits and vegetables) in your store?
Don't read answers out loud. Assign 1, 2, and 3 to 1st, 2nd, and 3rd top reasons.

_____ Hard to find

_____ Food goes bad/expires

_____ Doesn't sell well

_____ Not available at wholesaler. Specify wholesaler:_____

_____ Costs too much. Specify where:_____

_____ Not enough space in store

Respondent ID:_____

_____ My customers don't want it

_____ Other: _____

4.24. What fresh fruits or vegetables, if any, do you normally stock in your store? List:_____

4.25.Are there any fruits or vegetables that you want to stock in your store but do not? Yes ☐ No ☐ *(If 'no', skip to 4.27.)*

4.26. If you answered "Yes", what are those items? _____

4.27. What are the top 3 reasons that you do not stock them? *Don't read answers out loud. Assign 1, 2, and 3.*

_____ Hard to find

_____ Food goes bad/expires

_____ No refrigeration for fruits/vegetables

_____ Doesn't sell well

_____ Not available at wholesaler. Specify wholesaler:_____

_____ Costs too much. Specify where:_____

_____ Not enough space in store

_____ My customers don't want it

_____ Other: _____

Respondent ID:_____

SECTION B: STOREOWNER PSYCHOSOCIAL FACTORS

5. Outcome Expectations: Promoted Food Sales

I am now going to read you a series of statements about how well you think certain foods would sell in your store. For example, "BAKED CHIPS WILL SELL WELL IN MY STORE." Please keep in mind that your answers will not hurt my feelings; I want to know what you really think will happen. Please indicate how strongly you agree or disagree with each statement by choosing one of the following responses: strongly disagree, disagree, undecided, agree or strongly agree.

Food (---- will sell well in my store.)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Phase 1: Healthy Beverages					
5.1. 1% Milk, Rutters					
5.2. Bottled Water, Deer Park					
5.3. Pepsi Next					
5.4. Coke Zero					
Phase 2: Healthy Essentials					
5.5. Solid White Albacore Tuna in water, Bumblebee					
5.6. Chunk Light Tuna in water, Bumblebee					
5.7. 100% Whole Wheat Bread, 'Schmidt Old Tyme'					
5.8. Frozen Stir Fry, Bird's Eye					
5.9. Frozen Collards, Bird's Eye					
5.10. Frozen Broccoli, Bird's Eye					
Phase 3: Healthy Snacks					
5.11. Apples, Gala					
5.12. Bananas					
5.13. Oranges, Navel					

5.14. Reduced Fat Doritos					
5.15. Baked Potato Chips, Assorted Utz					
5.16. Granola Bar, Quaker Oats 90 calorie, Assorted					

6. Outcome Expectations: Impact of BHRR

I am now going to read you statements about what you feel will be the effect of the B'more Healthy Retail Rewards program on overall and promoted food sales. Your answers will not hurt my feelings; I want to know what you really think will happen. Please choose: strongly disagree, disagree, undecided, agree or strongly agree.

Outcome Expectations	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
6.1. If BHRR interactive sessions and taste tests of healthy foods/beverages take place in my store, **overall** food/beverage sales will increase.					
6.2. If BHRR recipe cards, shelf labels, and handouts are distributed for promoted foods/beverages, **overall** food/beverage sales will increase.					
6.3. If BHRR wall posters, door signs, and banners are displayed, **overall** food/beverage sales will increase.					
6.4. If I stock the healthy foods promoted by BHRR, **overall** food sales will increase.					
6.5. If the prices of BHRR promoted foods are reduced, **overall** food sales will increase.					
6.6. If I received a produce refrigerator for my store, **overall** food sales will increase.					
6.7. If I received a healthy food display for my store, **overall** food sales will increase.					
6.8.If BHRR interactive sessions and taste tests of promoted foods/beverages take place in my store, **promoted** food/beverage sales will increase.					
6.9. If BHRR recipe cards, shelf labels, and handouts are distributed for promoted foods/beverages, **promoted** food/beverage sales will increase.					
6.10. If BHRR wall posters, door signs, and banners are displayed, **promoted** food sales will increase.					
6.11. If I stock healthy foods promoted by BHRR, **promoted** food sales will increase.					
6.12. If the prices of BHRR promoted foods are reduced, **promoted** food sales will increase.					
6.13. If I received a produce refrigerator for my store, **fresh fruit/vegetable** sales will increase.					
6.14. If I received a produce refrigerator for my store, **promoted** food sales will increase.					
6.15. If I received a healthy food display for my store, **fresh fruit/vegetable** sales will increase.					

Respondent ID:_____

Outcome Expectations	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
6.16. If I received a healthy food display for my store, **promoted** food sales will increase.					
6.17. If I stock BHRR promoted food items, my **customer base** will increase.					
6.18. The BHRR program will give me a competitive advantage over other small food stores in the surrounding area.					

7. Self–efficacy for stocking of foods

The next set of questions asks you how sure you are that you can stock a particular food in your store. By this, I mean how sure are you that you can order food from vendors, make time to go buy the food and stock it, order the food and put it on the shelves (and make space for it). Please indicate how strongly you agree or disagree with each statement by choosing one of the following responses: strongly disagree, disagree, undecided, agree or strongly agree. [For example, "I CAN STOCK frozen vegetables IN MY STORE.]

Food (I can stock ---------in my store.)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Phase 1: Healthy Beverages					
7.1. 1 % Milk, Rutters					
7.2. Bottled Water, Deer Park					
7.3. Pepsi Next					
7.4. Coke Zero					
Phase 2: Healthy Essentials					
7.5. Solid White Albacore Tuna in water, Bumblebee					
7.6. Chunk Light Tuna in water, Bumblebee					
7.7. 100% Whole Wheat Bread, 'Schmidt Old Tyme'					
7.8. Frozen Stir-Fry Vegetables, Bird's Eye					
7.9. Frozen Collards, Bird's Eye					
7.10. Frozen Broccoli, Bird's Eye					
Phase 3: Healthy Snacks					
7.11. Apples, Gala					
7.12. Bananas					

Respondent ID:_____

7.13. Oranges, Navel					
7.14. Reduced Fat Doritos					
7.15. Baked Potato Chips, Assorted Utz					
7.16. Granola Bar, Quaker Oats 90 calorie, Assorted					

8. Intentions to sustain stocking of promoted foods/beverages

The next set of questions asks you what you plan to stock **after the BHRR program is completed**. I want to know what you really plan on doing --not what you think you are supposed to do. When you answer these questions, keep in mind that this is not a test. There are no right or wrong answers. Please answer each question, even if you do not think you plan on continuing to stock certain items.

Food (I will stock --------in my store after the program is completed.)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Phase 1: Healthy Beverages					
8.1. 1% Milk, Rutters					
8.2. Bottled Water, Deer Park					
8.3. Pepsi Next					
8.4. Coke Zero					
Phase 2: Healthy Essentials					
8.5. Solid White Albacore Tuna in water, Bumblebee					
8.6. Chunk Light Tuna in water, Bumblebee					
8.7. 100% Whole Wheat Bread, 'Schmidt Old Tyme'					
8.8. Frozen Stir-Fry Vegetables, Bird's Eye					
8.9. Frozen Collards, Bird's Eye					
8.10. Frozen Broccoli, Bird's Eye					
Phase 3: Healthy Snacks					
8.11. Apples, Gala					
8.12. Bananas					

8.13. Oranges, Navel					
8.14. Reduced Fat Doritos					
8.15. Baked Potato Chips, Assorted Utz					
8.16. Granola Bar, Quaker Oats 90 calorie, Assorted					

9. Intentions to sustain BHRR promotions

I am now going to ask you questions about conducting certain intervention activities **after the program has ended**. I want to know which activities you really plan on continuing – not what you think you are supposed to do. When you answer these questions, keep in mind that this is not a test. There are no right or wrong answers. Please answer each question, even if you do not think you would be conducting certain activities.

Intentions to sustain stocking, discounts, promotional activities	**Strongly Disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**	**Not Applicable**
9.1. If I receive discounts on B'More Healthy promoted foods and beverages from the wholesaler, I plan on passing the full discount on to my customers.						
9.2. I plan to continue to stock the promoted B'More Healthy foods, **even after the program is completed.**						
9.3. If I receive discounts for the promoted B'More Healthy foods during the program, I plan to continue discounts on them **even after the program is completed.**						
9.4. If I receive promotional materials to advertise the B'More Healthy foods during the program, I plan on continuing to display them, **even after the program is completed.**						
9.5. I plan on promoting healthy foods from the B'more Healthy program, **even after the program is completed.**						
9.6. If I receive a produce refrigerator, I plan to continue stocking fresh fruits and vegetables, **even after the program is completed.**						

Respondent ID:_____

Intentions to sustain stocking, discounts, promotional activities	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Not Applicable
9.7. If I receive a healthy food merchandizer, I plan to continue stocking healthy foods like fresh fruits and vegetables, **even after the program is completed.**						

10. Structural Incentives (Appendix B): FOR BASELINE INTERVIEW ONLY

10.1. Which of these structural incentives would you like best for your store (to increase the sales of healthier items like fruits and vegetables)?

Produce Refrigerator with Baskets……☐

Healthy Food Merchandizers……☐

Other ……☐ List:_____

10.2. What are the main reasons for your participation in this study?

_____

_____

Additional Comments: _____

Thank you for your time!

This page is intentionally left blank.

Respondent ID:_____

Time Interview Ended: _____:_____ AM/PM

"Thank you, we are VERY grateful for your help!"

INTERVIEWER ASSESSMENT

How was the quality of the SIQ? Good (1) Fair (2) Poor (3) Not useable (4)

Any comments?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

I have checked this questionnaire for completeness.

Interviewer Signature: _____

Date:_____

Appendix G. Storeowner Exposure Form

Resp. ID# _ _ _ _ _ _

Checked by____ Date: / /
Entered by____ Date: __/__/__

B'more Healthy Retail Rewards
Intervention Exposure Evaluation Form
Storeowner Level

Date: ___/___/___ Data Collector: _____

Resp. Name: _____Resp. ID#__ __ __ __ __ __
(First) (Last)

I'm going to ask you some questions about materials or other promotions that you **MIGHT** have seen **<u>at the Wholesaler</u>**

1. **Wholesaler Visits**
   Which wholesaler (or other food store) do you use most frequently for your store and how often do you go? (List top 3)

Wholesaler/store Name	**# times visited/bought something in past week**
1.1.	
1.2.	
1.3.	

2. Promoted Product Labeling at the Wholesaler (SHOW the LOGO p.8)

Have you seen BHRR shelf labels at participating wholesale stores?

	Phase	Labels	Yes	No	Maybe
2.1.	**1-3**	**BHRR Logo indicating promoted product - Deer Park Water**			
2.2.	**1-3**	**BHRR Logo indicating promoted product - Coke Zero**			
2.3.	**1-3**	**BHRR Logo indicating promoted product - Pepsi Next**			
2.4.	**1-3**	**BHRR Logo indicating promoted product - 1% Milk**			
2.5.	**2-3**	**BHRR Logo indicating promoted product - Frozen Vegetables**			
2.6.	**2-3**	**BHRR Logo indicating promoted product - 100% Whole Wheat Bread**			
2.7.	**2-3**	**BHRR Logo indicating promoted product - Canned Tuna in Water**			
2.8.	**3**	**BHRR Logo indicating promoted product - Any Fruits**			
2.9.	**3**	**BHRR Logo indicating promoted product - Utz Baked Chips**			
2.10.	**3**	**BHRR Logo indicating promoted product - Quaker 90 Calories Granola bars**			

3. Promoted Product Stocking (SHOW p.7)

Have you seen the following promoted products during most visits?

	Phase	Promoted Product	Yes	No	Maybe
3.1.	**1**	**Deer Park Water**			
3.2.	**1**	**Coke Zero**			
3.3.	**1**	**Pepsi Next**			
3.4.	**1**	**1% Milk**			
3.5.	**2**	**Frozen Vegetables**			

	Phase	Promoted Product	Yes	No	Maybe
3.6.	**2**	**100% Whole Wheat Bread**			
3.7.	**2**	**Canned Tuna in Water**			
3.8.	**3**	**Fruit incl. bananas**			
3.9.	**3**	**Utz Baked Chips**			
3.10.	**3**	**Quaker 90 Calories Granola bars/Cereal Bars**			

3.11. Were there items that *you noticed* were consistently **not** stocked when you went to make purchases at the wholesaler? __Yes __No

3.12. If yes, what items did you noticed were **not** stocked?

_____

_____

4. Discounted Pricing (SHOW p.7)

Have you noticed a decrease in price in any of the promoted products at the wholesaler?

	Phase	Promoted Product	Yes	No	Maybe
4.1.	**1**	**Deer Park Water**			
4.2.	**1**	**Coke Zero**			
4.3.	**1**	**Pepsi Next**			
4.4.	**1**	**1% Milk**			
4.5.	**2**	**Frozen Vegetables**			
4.6.	**2**	**100% Whole Wheat Bread**			
4.7.	**2**	**Canned Tuna in Water**			

	Phase	Promoted Product	Yes	No	Maybe
4.8.	**3**	**Fruit incl. bananas**			
4.9.	**3**	**Utz Baked Chips**			
4.10.	**3**	**Quaker 90 Calories Granola Bars**			

5. Lifestyle changes

Which, if any, of the following ***lifestyle*** changes did you make **BECAUSE** you saw BHRR materials, or participated in BHRR taste tests/promotions in your store?

0 = No, did not change
1 = Yes, made a little change
2 = Yes, made a lot of change

	Score	Change
	Phase I: Drinks	
5.1.		**Drink more water**
5.2.		**Drink lower calorie beverages (e.g., lite iced tea, club-soda, etc)**
5.3.		**Switched from regular to lower-sugar or sugar-free soda (Promoted sodas: Coke Zero, Pepsi Next)**
5.4.		**Drink lower fat milk (1% milk)**
5.5.		**Drink more 100% orange juice***
	Phase II: Essentials	
5.6.		**Used one or more of our recipe card handouts** **Specify recipes used**_____
5.7.		**Eat more fresh or frozen vegetables**
5.8.		**Use more 100% whole wheat bread (to make sandwiches for customers or personal consumption)**
5.9.		**Switch from canned tuna in oil to canned tuna in water**
	Phase III: Snacks	

	Score	Change
5.10.		**Switched from cookies, cakes, pastries to Granola Bars (Quaker 90 calorie bars)**
5.11.		**Switched from regular chips to baked chips (Baked Utz regular flavor or BBQ flavor)**
5.12.		**Select lower calorie/lower fat/lower sodium/lower sugar snacks**
5.13		**Eat more fresh fruits**
		General
5.14		**Other_____**
5.15		**Other_____**
5.16		**Other_____**
5.17		**DID NOT SEE ANY MATERIALS**

6. Social Media

6.1. Are you on Facebook? __Yes __No

6.2. If so, have you LIKED the BHRR Facebook? __Yes __No __Not Sure

6.3. Have you seen the BHRR Facebook updates? __Yes __No __Not Sure

7. Additional Comments:

_____

_____

_____

_____

_____

_____

_____

_____

Phase 1: Better Beverages	Phase 2: Healthy Essentials	Phase 3: Healthy Snacks
    	      	    


B'MORE
HEALTHY!
RETAIL
REWARDS

Appendix H. Wholesaler Process Evaluation Form

Data checked by: ……..
Date of checking:……..
Data entered by: …….
Date of entry: ……
Form ID: ……..

Store ID:_____

BHRR Wholesaler PE Sales and Stocking Form

This bi-weekly assessment is to be completed by a process evaluator.

Data Collector: _____ Date: _____/_____/_____ Day of the week:_____

Time In: ____ :____AM/PM Time Out: ____ :____AM/PM

Wholesaler location: Belair Road (East) Monroe St (West)

Phase (circle one):

Baseline/Phase 0: Teasers Phase 1: Better Beverages Phase 2: Healthy Essentials Phase 3: Healthy Snacks Post

Stocking/placement of promoted foods/beverages

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
Phase 1: Better Beverages								
1. Bottled Water, Deer Park	32-pack/ 16.9 fl oz.			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
2. Bottled Water, Deer Park	24-pack/ 16.9 fl oz.			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
3. Bottled Water, Deer Park	28-pack/ 23.7 fl oz.			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
4. Bottled Water, Deer Park	24-pack/ 23.7 fl oz.			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
5. Pepsi Next	24-pack/ 20 fl oz bottle			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Store ID:_____

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
6. Pepsi Next	6-pack/ 20 fl oz bottle			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
7. Coke Zero	24-pack/ 20 fl oz bottle			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
8. Coke Zero	6-pack/ 20 fl oz bottle			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
9. 1 % Milk, Rutters	Gallon			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
10. 1 % Milk, Rutters	Half Gallon			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
11. 1 % Milk, Rutters	Quart			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Phase 2: Healthy Essentials								
TUNA IN WATER								
12. Solid White Albacore Tuna in water, **StarKist**	48 pack, 5 oz cans			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
13. Solid White Albacore Tuna in water, **Starkist**	12 pack, 5 oz cans			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
14. Solid White Albacore Tuna in water, **StarKist**	6 pack, 5 oz cans			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Store ID:_____

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
15. Solid White Albacore Tuna in water, **Bumblebee**	48 pack, 5 oz cans			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
16. Solid White Albacore Tuna in water, **Bumblebee**	8 pack, 5 oz cans			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
17. Solid White Albacore Tuna in water, **Bumblebee**	6 pack, 5 oz cans			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
18. Chunk Light Tuna in water, **StarKist**	48 pack, 5 oz can			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
19. Chunk Light Tuna in water, **StarKist**	6 pack, 5 oz can			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
20. Chunk Light Tuna in water, **Bumblebee**	48 pack, 5 oz can			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
21. Chunk Light Tuna in water, **Bumblebee**	6 pack, 5 oz can			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
22.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
23.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Store ID:_____

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
TUNA IN WATER continued…								
24.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
25.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
BREAD								
26. 100% Whole Wheat Bread, 'Schmidt Old Tyme'	1 Loaf			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
FROZEN VEGETABLES		*Note: Indicate whether frozen vegetables "bag" or "box" in standard unit section*						
27. Frozen Corn, **name brand**	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
28. Frozen Corn, **generic brand**	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
29. Frozen Spinach, **name brand**	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
30. Frozen Spinach, **generic brand**	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
31. Frozen Broccoli, **name brand**	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Store ID:_____

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
32. Frozen Broccoli, **generic brand**	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
33.	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
34.	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
35.	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
36.	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
37.	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
38.	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Phase 3: Healthy Snacks								
39. Apples, Gala	3 lb bag bag (10 apples)			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
40. Apples, Red Delicious	3 lb bag bag (10 apples)			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
41. Oranges, Navel	4 lb. bag (10 oranges)			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Store ID:_____

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
42. Oranges, Navel	1 fruit			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
43. Bananas (3 bananas=1lb)	1 bunch		_____ Per lb	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
44. Strawberry	1 pint			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
45. Red Grapefruit	1 fruit			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
46. Mango	1 fruit			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
47. Pineapple	1 fruit			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
48. Other Fruit, **Name** _____	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
49. Other Fruit, **Name** _____	_____			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
50. Baked Potato Chips, Plain Utz	1.125 oz. bag			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
51. Baked Potato Chips, BBQ Utz	1.125 oz. bag			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
52. Granola Bar, Quaker Oats 90 calorie, Chocolate chunk	1 small box (8 bars)			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
53. Granola Bar, Quaker Oats 90 calorie, variety box	1 large box (48 bars)			Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Store ID:_____

Food	Standard Unit	Number stocked (specify unit, e.g. 1 case = 24 bottles)	Price (specify price and unit below)	Labels Present: Price and BHRR Logo			Item advertised in the circular/website since last assessment? If yes, name date(s)	Comment here if item is not easily visible, quality is poor/great, expired dates on units, or new display location added, etc.
				Price Marked	BHRR Logo present	BHRR logo is marking the appropriate item		
54.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
55.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
56.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
57.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
58.				Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

Comments

Include any additional comments on the wholesaler environment below (e.g., lighting, signage, displays, cleanliness, staffing).

Bi-weekly wholesaler reports

Attach sales data here – 16 items X 24 stores, including receipt of POP discount (given at time of purchase) for 12 stores

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CURRICULUM VITAE

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PERSONAL DATA

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EDUCATION

2016 **Doctor of Philosophy (Ph.D.) Candidate in International Health**

Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Dissertation: Impact of a pricing and communications intervention with food wholesalers and small stores to improve the food environment in Baltimore City
Advisor: Dr. Joel Gittelsohn

2009 **Masters of Science in Human Nutrition**

University of Bridgeport, Bridgeport, CT

2002 **Bachelor of Arts in Health and Human Sciences**

Goddard College, Plainfield, VT

PROFESSIONAL EXPERIENCE

Public Health Nutrition

2014-present **Senior Analyst,** Global Obesity Prevention Center (GOPC)
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Manage and analyze impact and process evaluation data for the *B'More Healthy Retail Rewards* trial, a community-based, randomized controlled intervention

with food wholesalers, store-owners, and low-income residents of Baltimore City. (PI: Dr. Joel Gittelsohn). Prepare lead author study publications.

2011 - 2014 **Program Coordinator**, Center for Human Nutrition
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Managed BHRR project: managed staff, data collection, intervention implementation, and analysis; conducted on-site progress assessments of activities; collected data; conducted qualitative interviews and intervention activities, managed partnerships with key stakeholders; led regular team meetings, co-investigator meetings and conference calls; prepared publications, progress and IRB reports; and applied for additional grant funding.

Consulted for NBC's "Main Street Makeover" segment; provided recommendations on foods and strategies to encourage healthier food purchase and consumption in an inner-city small food store. http://www.today.com/money/baltimore-business-gets-main-street-makeover-1D80102375

2012 **Research Assistant**, Center for Human Nutrition
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Recruited stores and store-owners in Garrett County, MD for *Maryland Healthy Stores*, a small food store intervention in 7 CDC-designated rural Maryland counties to increase access to and consumption of healthier food choices as a means to reduce risks associated with obesity and other diet-related chronic diseases. (PI: Dr. Joel Gittelsohn)

2011-2012 **Research Assistant**, Center for Human Nutrition
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Assisted in preparation of IRB applications, research plan documentation, and NIH progress reports; drafted and revised data collection instruments; assisted in branding, names, and final logo design for the project; participated in intervention development; led data collector trainings; attended weekly meetings and conference calls; member of a sub-committee working with food wholesalers in Baltimore City, for *B'More Healthy Communities for Kids*, a five year systems science-based multicomponent, obesity prevention trial operating at multiple levels of the Baltimore City food system (PI: Dr. Joel Gittelsohn)

2010-2011 **Interventionist**, Center for Human Nutrition
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Developed intervention materials, conducted interactive sessions with study participants, provided nutrition education, conducted focus groups, and created Manual of Procedures for the American Diabetes Association (ADA), and attended team and relevant ADA meetings, for *Healthy Bodies Healthy Souls*, a church-based diabetes prevention program for African American church members in Baltimore City. (PI: Dr. Joel Gittelsohn)

2011 **Research Assistant**, Department of Social and Behavioral Interventions
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Selected promoted foods and created healthy recipes; conducted supermarket food assessments; attended weekly team meetings, for *Eat Right Live Well*, an innovative supermarket intervention that aimed to increase the purchase of healthy promoted foods in a low-income neighborhood in southwest Baltimore City. (PI: Dr. Pamela Surkan)

2010 **Research Assistant**, Center for Human Nutrition
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Created food model kits for dietary assessments (24-hour dietary recalls and quantitative food frequency questionnaires (QFFQ)), attended weekly team meetings and conference calls, for *OPREVENT*, a multilevel, randomized controlled obesity prevention trial for American Indian communities throughout the United States. (PI: Dr. Joel Gittelsohn)

2010 **Research Assistant**, University of North Carolina, Nutrition Research Institute, Kannapolis, NC

Developed food composition tables for QFFQs related to international projects with Japanese-Brazilian, Apache, and low-income minority populations in the United States; assisted in the writing, editing and revising of papers for *Healthy Foods North* and related projects. (PI: Dr. Sangita Sharma)

Member of Healthy Foods North team, a community-based nutritional and physical activity intervention program, awarded the 2010 *Speaking of Food and Healthy Living Award* for Alberta and the Northwest Territories, Canada.

Teaching

Undergraduate

2015 **Instructor**, Johns Hopkins University, Baltimore, MD

Developed and taught *Discover Hopkins: Food, Nutrition, and Public Health,* a two-week intensive summer course of approximately 13 students. The course introduced nutrition 101 concepts, obesity and chronic disease, the Nutrition Transition, energy balance and weight maintenance, malnutrition and food borne illness, and dietary trends. Week 2 focused on food systems and policy, health inequities, food insecurity and hunger, environmental, behavioral, social, and cultural influences on food choice, and dietary interventions. Activities and discussions were framed using the social ecological model for behavior change. In-class sessions were structured as discussion seminars based around the readings and daily field trips (e.g., a food bank, a locally-sourced restaurant), and supplemented with lectures (including guest speakers). Class sessions engaged students to think critically; the final project required student groups to research a current public health problem among a specific population and setting, and then develop and present a culturally-appropriate, diet-related intervention to the class. (July 6-17)

2015 **Adjunct Professor**, Anne Arundel Community College, Arnold, MD

Taught *Nutrition for Fitness and Sport,* an undergraduate nutrition course (that I developed previously) with emphasis on nutritional needs of physically active individuals, ergogenic aids, and the role of macro- and micro-nutrients in maximizing athletic performance. 8 weeks (Mar-May)

2015 **Instructor**, Johns Hopkins University, Baltimore, MD

Co-instructed *B'More! Whole Food vs. Junk Food,* a one week intensive intersession course of approximately 23 students. The course explored Baltimore City's complex food system, and current limitations and strategies to assure widespread access to nutritious, adequate and affordable food. Students gained hands-on experience through visiting a locally sourced restaurant, an urban farm, a public market, and an emergency food distribution center. The in-class lectures were structured around readings and field trips. Students rated overall course quality a 4.67 and instructor's teaching effectiveness a 4.76 (out of 5 total points). (January 19-24)

2014 **Adjunct Professor**, Anne Arundel Community College, Arnold, MD

Developed course and taught *Nutrition for Fitness and Sport,* an undergraduate nutrition course with emphasis on nutritional needs of physically active individuals, ergogenic aids, and the role of macro- and micro-nutrients in maximizing athletic performance. 8 weeks (Oct-Dec).

Graduate

2013 **Teaching Assistant**, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Lectured on environmental approaches to improving healthy food access, graded assignments and projects, and assisted students for graduate nutrition course, *Food, Culture, and Nutrition*, with Dr. Joel Gittelsohn. (4th term)

2013 **Teaching Assistant**, Johns Hopkins Carey School of Business, Baltimore, MD

Graded assignments and assisted students for *Customer-Focused Marketing,* a graduate business course designed for dual-track MBA/MPH students, with emphasis on health care marketing and management, with instructor Fred Katz. (Spring term)

Business Diversity and Leadership Experience

2014 - Present **Marina owner/manager**, Nugent Marina, Rockhold Creek, MD

Oversee operations for a 35-wet slip marina; answer phones and emails, manage customer accounts, assist incoming and outgoing boaters, handle customer inquiries and concerns, represent marina at annual Annapolis boat shows.

2009 **Divemaster/Mate**, Cape Fear Dive Center, Carolina Beach, NC

Divemaster and first mate on Hawksbill, a 50-foot diving vessel; responsible for diver safety, setting and releasing anchor, conducting dive site briefings, loading tanks and gear, and assisting divers. Dive trips conducted 30 miles off of the southeast coast of North Carolina at an average depth of 100 feet. (Weekends)

2008-2009 **Consultant and health educator**, Eat-2-Live Well, Wilmington NC

Provided nutrition education and individual diet plans to clients of chiropractors and acupuncturists in Wilmington, NC.

2008 **Boat Sales/Broker**, Cape Fear Yacht Sales, Wilmington, NC

Sold “Century” sport fishing boats; brokered used power boats and yachts.

2003-2008 **Owner**, Seahorse Dive Group, Galesville, MD

Operated and managed a commercial diving operation with 3 part-time employees and 150 customers; conducted underwater boat repair, cleaning, and search and salvage; responsible for marketing, sales, and service.

2001-2003 **Program Manager**, Kushi Institute, Becket MA

Managed the *Macrobiotic Leadership Certificate Program (MLP),* a vegan and whole foods approach to disease prevention and health. Developed program materials for instructors and students, scheduled classes and coordinated guest speakers, served as the liaison between faculty and the executive director, and mediated on behalf of students.

1997-1998 **Scuba Instructor**, University of Florida, Gainesville, FL

Open Water Scuba Instructor for the University of Florida Academic Diving Program (UFADP); provided instruction and certification for university students including diving trips to Florida Keys, Southeast Florida, and inland springs and caves.

VOLUNTEER SERVICE

2015 **Volunteer**, Maryland Food Bank, Halethorpe, MD

Coordinated ~25 student volunteers and helped to package foods by category (January & July).

2013 **Volunteer**, Food Depot, Baltimore, MD

Measured blood pressure, weight, and height, calculated BMI, answered customer questions on diet and nutrition, handed out healthy recipe cards for annual health fair.

2003-2013 **Crewmate**, Eastern United States

Delivered 50-foot catamarans off-shore from Annapolis, MD to Southeast Florida following Annapolis annual sailboat shows (October).

2008-2009 **Nutrition Educator**, New Hope Clinic, Southport, NC

Provided biweekly nutritional education services to uninsured, low-income residents of Brunswick County at a not-for-profit health clinic in Southport, NC.

2006-2008 **Nutrition Educator**, Hartge Yacht Yard, Galesville, MD

Provided dietary counseling and menu plans, as needed, for individual marina employees with chronic conditions (i.e., high triglycerides, high LDL cholesterol).

2001 **Volunteer**, Center Pond Association, Becket, MA

Pulled Eurasian milfoil weeds by scuba for Becket's lakes and waterways.

1999 **Volunteer cook**, Kushi Institute, Becket, MA

Whole foods cook for program participants, including head cook position for *Way to Health* program, a week-long program geared towards those choosing alternative ways to heal from illness.

1998 **Volunteer**, Rutgers University, New Brunswick, NJ

Affiliated with Rutgers University, instructed and participated in various sports with individuals with mental and physical disabilities.

HONORS AND AWARDS

2015 **The Elsa Orent Keiles Fellowship in Human Nutrition**

Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

2013 **George G. Graham Endowment Travel Award**

Center for Human Nutrition, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

2012 **Journey through Science Day recipient**

The New York Academy of Sciences, New York, NY

One of 50 students and early career scientists selected to present current research to NYAS and PepsiCo industry leaders.

2011 **The Lazzara Family Foundation Scholarship in Public Health**

Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Awarded to one individual with significant contributions to the field of obesity prevention research.

PUBLICATIONS

Journal Articles

Sharma S, Kolahdooz F, Butler L, **Budd N**, Rushovich B, Mukhina G, Gittelsohn J, Caballero B. Assessing dietary intake among infants and toddlers 0-24 months of age in Baltimore, Maryland, USA. *Nutrition Journal* 2013; 12:52.

Kharmats AY, Jones-Smith JC, Cheah YS, **Budd N**, Flamm L, Cuccia A, Mui Y, Trude A, Gittelsohn J. Relation between the Supplemental Nutritional Assistance Program cycle and dietary quality in low-income African Americans in Baltimore, Maryland. *The American Journal of Clinical Nutrition* 2014; 99(5):1006-1014.

Budd N, Cuccia A, Jeffries JK, Prasad D, Frick KD, Powell L, Katz FA, Gittelsohn J. B'More healthy retail rewards - Design of a multilevel communications and pricing intervention to improve the food environment in Baltimore City. *BMC Public Health* 2015; 15:283.

Mui Y, Lee BY, Adam A, Kharmats AY, **Budd N**, Nau C, Gittelsohn J. Healthy versus unhealthy suppliers in food desert neighborhoods: a network analysis of corner stores' food supplier networks. *Int. J. Environ. Res. Public Health* 2015; 12, 15058-15074.

Journal Articles under review

Kim M, Budd N, Gittelsohn J., Barriers and Facilitators to Stocking Healthy Food Options: Viewpoints of Baltimore City Small Storeowners. Ecology of Food and Nutrition (Under Review)

Journal Articles in preparation

Budd N, Jeffries JK, Jones-Smith JC, Kharmats AY, McDermott AY, Gittelsohn J. Store-directed price promotions and communications strategies improve healthier food supply and demand: Impact results from a Baltimore City store-intervention trial. (In preparation to be submitted to *Public Health Nutrition*)

Budd N, Jeffries JK, Kim M, Kharmats AY, Cuccia A, Gittelsohn J. Implementation of a pricing and communications intervention with food wholesalers to increase healthy food supply and demand in Baltimore City corner stores. (In preparation to be submitted to *BMC Public Health*)

Leite FHM, Cremm EC, Abreu, DSC, Oliveira MA, **Budd N**; Martins PA. Association of neighbourhood food availability with the consumption of ultra-processed food products by children in a city of Brazil: a multilevel analysis. (In preparation).

Mui Y, Kharmats AY, Jones-Smith J, **Budd N**, Coakley H, Gittelsohn J. Association of psychosocial factors with healthy versus unhealthy food acquisition among low-income, urban African Americans adults. (In preparation to be submitted *Journal of Nutrition Education and Behavior)*.

PRESENTATIONS

Oral Presentations

Farner H, Summer A, **Budd N**, Gittelsohn J. "Healthy Bodies, Healthy Souls: A Faith-Based Environmental Intervention to Prevent Diabetes in African Americans." Paper presented at the 72nd annual meeting of the Society for Applied Anthropology, Baltimore, MD, March 27-31, 2012.

Mui Y, Adam A, **Budd N**, Kharmats A, Boulay M, Robinson N, Lee BY, Gittelsohn J. "Evaluating the healthy versus unhealthy food supply network in an urban, low-income setting." Paper presented at the annual Experimental Biology Conference, San Diego, CA, April 2014

Poster Presentations

Budd N, Surkan P, Martins P, Rowan M, Flamm L, Gittelsohn J, Food Preparation methods among African American churchgoers and associations with body mass index (BMI) and food purchasing behaviors. 2011 Experimental Biology. *FASEB J March 17, 2011 25:971.12*

Robb K, Rubin M, **Budd N**, Surkan P, Martins P, Gittelsohn J., The association of food purchasing and body mass index (BMI) among African American church members in urban Baltimore, MD. 2011 Experimental Biology. *FASEB J March 17, 2011 25:971.7*

Sharma S, Butler L, **Budd N**, Chinyanga YT, Rushovich B, Mukhina GL, Gittelsohn J, Caballero B. Assessing dietary intake among infants and toddlers 0-24 months of age in Baltimore, Maryland. 2011 Experimental Biology. *FASEB J March 17, 2011 25:603.10*

Budd N, Gittelsohn J. B'More Healthy: Retail Rewards: Development of a multi-level communications and pricing intervention to improve the food environment in Baltimore City. *New York Academy of Sciences/PepsiCo Career Day*, New York NY, December 10, 2012

Budd N, Liu D, Cuccia A, Jock B, Jeffries J, Frick K, Gittelsohn J. Low food security is associated with higher BMI among low-income African American residents of Baltimore City. 2013 Experimental Biology. *FASEB J April 9, 2013 27:1054.5*

Liu D, **Budd N**, Cuccia A, Jock B, Jeffries J, Katz F, Gittelsohn J. Identifying healthy foods for promotion in an urban corner store intervention. 2013 Experimental Biology. *FASEB J April 9, 2013 27:842.4*

Cuccia A, Powell L, **Budd N**, Jock B, Liu D, Jeffries J, Gittelsohn J. Patterns of food source usage among low-income African Americans are associated with dietary intake. 2013 Experimental Biology. *FASEB J April 9, 2013 27:842.18*

Mui Y, Adam A, Kharmats A, **Budd N**, Lee BY, Gittelsohn J. Influence of supply network on the availability of healthy foods in small food stores of urban, low-income settings. 2014 Experimental Biology. *FASEB J April 26, 2014. 28:1:384.4*

INVITED LECTURES

'Environmental Approaches: Food store and other point of purchase interventions'. Food, Culture, and Nutrition (222.654.01). Johns Hopkins Bloomberg School of Public Health, Baltimore MD, May 8, 2013

'Changing the food environment to prevent chronic disease'. Health Disparities Intersession. Johns Hopkins School of Medicine, Baltimore MD, August 15, 2013

AD-HOC EDITORIAL REVIEWS

Ecology of Food and Nutrition

MENTORSHIP

B'More Healthy Retail Rewards Research Assistants

Undergraduate Research Assistants

Sangwon (Sarah) Chung, Intern, Korea-U.S. Science Cooperation Center (KUSCO), Nov 2012-Feb 2013
Jodi Askew, Public Health, The George Washington University, May – Aug 2013
Christine Kim, Public Health, JHU. Class of 2013. Jan-Aug 2012
Hyunju Kim, Public Health, JHU. Class of 2014. Aug-Dec 2012

Graduate Research Assistants and student investigators

Alison Cuccia, MSPH. Class of 2013. Aug 2011- Aug 2013
Divya Prasad, MPH. Class of 2012. Aug 2011- Aug 2012
Jayne Jeffries, MHS. Class of 2012. Jan 2012 - Aug 2012
Debra Liu, MSPH. Class of 2013. Dec 2012- Aug 2013
Emily Stone MSPH. Class of 2013. Aug – Dec 2013
Elisa Pehlke MSPH. Class of 2013. Aug – Dec 2013
Angela Trude. Visiting graduate student, University of Sao Paulo, Brazil. Aug – Dec 2013
Anna Kharmats, PhD student in Social & Behavioral Interventions, Aug 2011- Aug 2012
Mhinjine Kim MSPH. Class of 2013. Aug 2011- Aug 2013
Jae Kim MSPH. Class of 2013. Dec 2013
Yoon Seung Lee MSPH. Class of 2013. Jan – June 2013
Swathi Manchikanti, Class of 2013.Oct 2011-Mar 2012
Greer Waldrop, Class of 2013. Oct 2011-Mar 2012

Benjamin Batorsky, Class of 2013. Oct 2011-Mar 2012
Carleigh Krubiner, PhD student in Ethics. Oct 2011-Mar 2012

RESEARCH GRANT PARTICIPATION

Awarded grants

Improving the Baltimore City food environment through structural incentives to small food sources
Sponsoring Agency: The Abell Foundation
Role: Project Coordinator
Dates: 1/20/2013-12/31/2014, $150,000
Project: To provide small store and carry-out structural incentives that will facilitate greater availability and sales of healthier food and beverage options within low-income minority neighborhoods, and to systematically evaluate the impact and sustainability of the program in order to inform public policy for obesity and chronic disease prevention in underserved urban areas.
Responsibilities: To manage and coordinate data collection activities, conduct on-site progress assessments of activities, and help manage partnerships with key stakeholders. Preparation of publications, progress and IRB reports, data analysis and manuscript preparation.

Submitted grants
Tracking the long-term impact and sustainability of environmental and policy interventions in Baltimore City
Sponsoring Agency: The Center for a Livable Future
Role: Project Coordinator
Dates: 4/1/12 – 10/1/13, $195,653
Project: To establish and track a cohort of city residents will serve as a baseline sample to determine the impact of this and future food policy initiatives throughout Baltimore City over time. In addition, our assessment of nutrient intake by food source will provide detailed evidence of the most important food venues in which to focus future policy and public health efforts.
Responsibilities: To manage and coordinate data collection activities, conduct on-site progress assessments of activities, and help manage partnerships with key stakeholders. Preparation of publications, progress and IRB reports, and manuscript preparation. Oversee data quality control, and will participate in the data collectors' training.

CURRICULUM VITAE

NADINE BUDD, M.S.

PART II

ADDITIONAL INFORMATION

Statement of Research Interests

My research interests pertain to obesity prevention and reduction through multi-level, environmental, and pricing-based interventions. I am particularly drawn to exploring the role food industry stakeholders can play in creating long-term, positive health changes in low-income settings. Through both self-regulatory practices and policy efforts, food manufacturers, distributors and retailers have the potential to make dramatic improvements in the food supply, and in consumer demand via shifting food preferences and norms. Food access interventions, coupled with individual behavior change strategies, have the potential to greatly reduce rates of obesity and related chronic disease nationally.

Specific interests include:

1. The changing nutritional needs of Americans within current food systems
2. The role of food taxes, subsidies, and trade allowances to create behavior change
3. The use of behavioral change theory to inform nutrition and obesity reduction programs
4. Community-based, participatory program development
5. Process and impact program evaluation
6. Development of partnerships between public health organizations and food industry stakeholders
7. Equitable access to healthful food

KEYWORDS

Public health nutrition
Obesity prevention
Chronic disease prevention
Low-income populations
Qualitative and quantitative research methods
Behavioral interventions
Pricing interventions
Food environment
Food access
Food policy
Food supply chain
Trade allowances